92160R01
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IRONDALE CONTROL SYSTEM
ROCKY MOUNTAIN ARSENAL

REVIEW OF 1991 OPERATIONS

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Prepared for
Shell Oil Company

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THIS REPORT SUMMARIZES THE OPERATION OF THE IRONDALE CONTROL SYSTEM ON THE ROCKY MOUNTAIN ARSENAL DURING CALENDAR YEAR 1991. WATER TABLE CONTOUR MAPS AND 1,2-DIBROMO-3-CHLOROPROPANE (DBCP) ISOCONCENTRATION MAPS HAVE BEEN PREPARED FROM QUARTERLY MONITORING DATA COLLECTED DURING THE 1991 PERIOD. A DESCRIPTION OF THE EXTRACTION AND RECHARGE WELLS AND TREATMENT PLANT IMPROVEMENTS COMPLETED AS PART OF THE RAIL CLASSIFICATION YARD/MOTOR POOL AREA INTERIM RESPONSE ACTION IS PROVIDED.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This report summarizes the operation of the Irondale Control System (ICS) on the Rocky Mountain Arsenal (RMA) during calendar year 1991. Water table contour maps and 1,2-dibromo-3-chloropropane (DBCP) isoconcentration maps have been prepared from quarterly monitoring data collected during the 1991 period. A description of the extraction and recharge wells and treatment plant improvements completed as part of the Rail Classification Yard/Motor Pool Area Interim Response Action (IRA) is provided.

The alluvial aquifer exhibited similar seasonal fluctuations during the 1991 period as in previous years. The water table elevations increased slightly over those observed in 1990. The higher water table was at least partially due to decreased pumping during summer and fall months by South Adams County Water and Sanitation District (SACWSD) wells adjacent to the RMA. The average flowrate of the ICS treatment system increased from 1,014 in 1990 to 1,223 gallons per minute during 1991.
The DBCP plume continues to appear to be decreasing in concentration. Average concentrations of treatment plant influent were about 0.28 ug/l during 1991.

The ICS treatment plant performed very well during 1991. Stream factors were above 99 percent for the year. The activated carbon treatment plant effectively removed detectable quantities of DBCP.

During January and April monitoring events, DBCP was detected in a few monitoring wells at the south end of the old extraction system. A limited quantity of DBCP may have passed beyond the ICS and into SACWSD wells. These SACWSD wells are connected to a water treatment system that uses granular activated carbon to

remove contaminants. No DBCP was detected beyond the system during the July and October quarterly sampling events when the majority of the IRA modifications to the ICS were in operation.

1.0 BACKGROUND

The Rocky Mountain Arsenal covers over 17,000 acres near Denver, Colorado, in Adams County (Figure 1). Part of the RMA was leased for the manufacture of pesticides and herbicides. In March 1980 one of these pesticides, 1,2-dibromo-3-chloropropane (DBCP), was discovered in some alluvial wells in the Irondale community along the northwest boundary of the RMA. Chemical and groundwater level data collected after March 1980 indicated that groundwater contaminated with DBCP was flowing off the RMA in the northwest corner of Section 33. The data also indicated that the contaminated groundwater extended northwest from the vicinity of the Rail Classification Yard in Section 3 (Figure 2).

In order to eliminate the off-post migration of the groundwater containing DBCP, Shell Chemical Company (Shell) constructed a groundwater control system, known as the Irondale Control System, in the northwest corner of Section 33 and southwest corner of Section 28 (Figure 3). The system became operational in 1981. The original system has been modified to include additional extraction and recharge wells and a new adsorber. The ICS was designed to pump the groundwater contaminated with DBCP from the alluvial aquifer, treat the pumped water, then recharge the effluent back into the aquifer. Documents have been previously published that discuss the design of the ICS and modifications to the system that were made prior to 1991.

In the spring of 1989 and the spring of 1990, very low levels of DBCP (below USATHAMA certified reporting limits) were detected in SACWSD wells. Although the detections in the SACWSD wells were much lower than the Maximum Contaminant Level (MCL) of 0.2 ug/l for DBCP they raised questions regarding the effectiveness of the ICS in intercepting all of the DBCP plume. Consequently, Shell

installed five new monitoring wells near the south end of the ICS during March and April 1990. DBCP was detected in some of the new wells when they were sampled in April 1990. Investigations were initiated to assess the performance of the system to ensure DBCP plume capture.

Low levels of DBCP were also detected on the southern end of the ICS during quarterly monitoring in July, 1990. The Army, EPA, Colorado Department of Health (CDH), SACWSD and Tri-County Health Department (TCHD) were notified of the sampling results. Engineering design was completed in the fall of 1990 and with the concurrence of all parties, the Rail Classification Yard/Motor Pool Area IRA was modified to include the proposed improvements to the ICS. All improvements to the system were fully operational by September 1991.

At the end of 1991 the system was composed of the following main elements:

- Four sets of extraction wells, 50 total: The West Row (the rear or down gradient row) consisting of 16 wells, the Center Row consisting of 21 wells, the East Row consisting of 4 wells, the Rail Classification Yard System consisting of 7 wells and 2 Motor Pool wells (Figures 3 and 4).

- Three upflow, pulsed bed, granular activated carbon adsorbers (each with a 40,000 lb capacity) arranged in a parallel configuration. Two adsorbers are normally on-line while the third is available for backup.

- Two rows of recharge wells, one row of 22 recharge wells adjacent to the RMA boundary and another row of

10 recharge wells oriented in a north-south direction at the south end of the West extraction row (Figure 3).

In addition, a large number of monitoring wells near the ICS and along the DBCP plume (Figures 5 and 6) are available for monitoring both the movement of the DBCP plume and the effectiveness of the ICS in intercepting the plume.

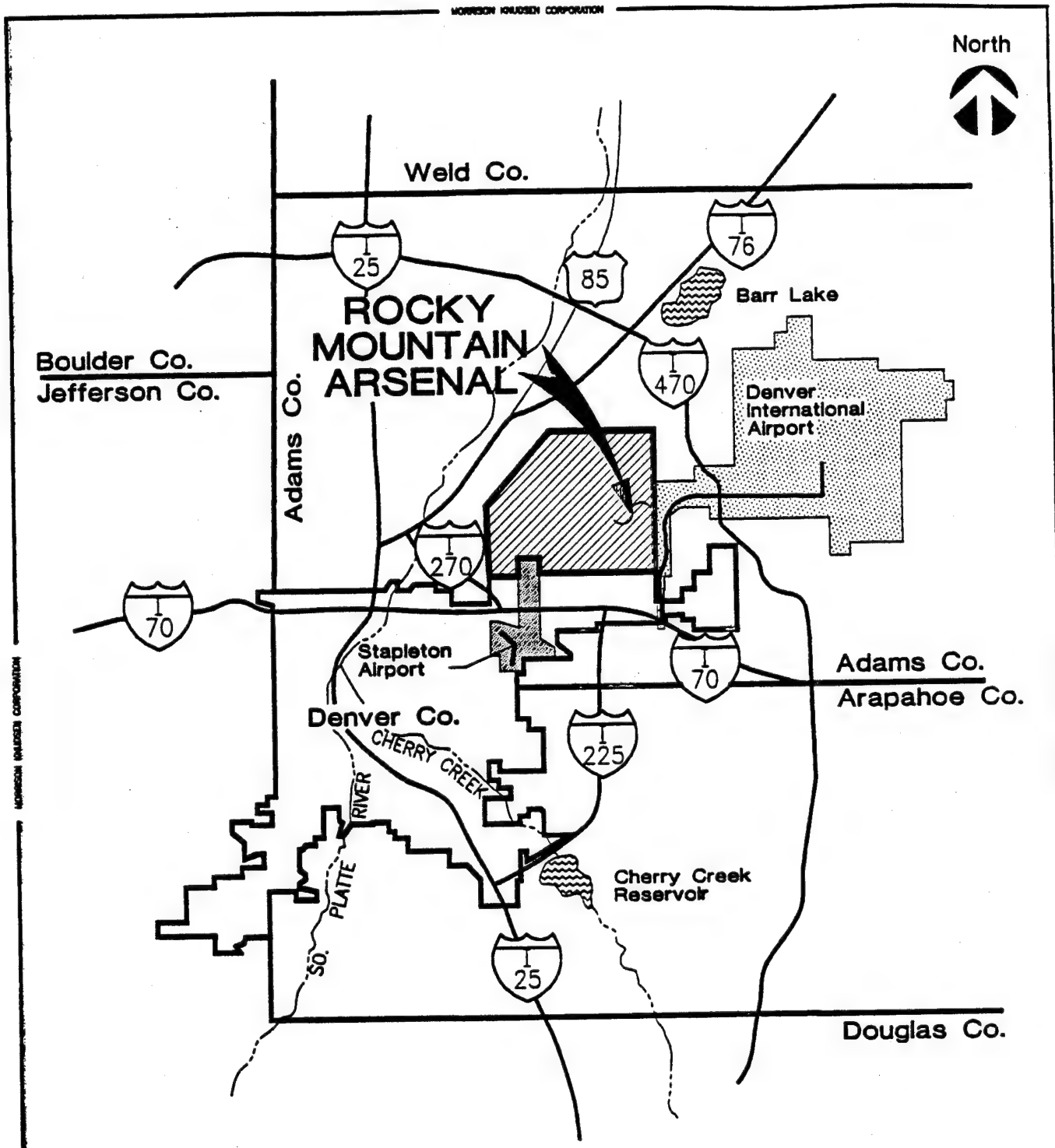

Figure 1

Rocky Mountain Arsenal

Location Map

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ENVIRONMENTAL SERVICES DIVISION

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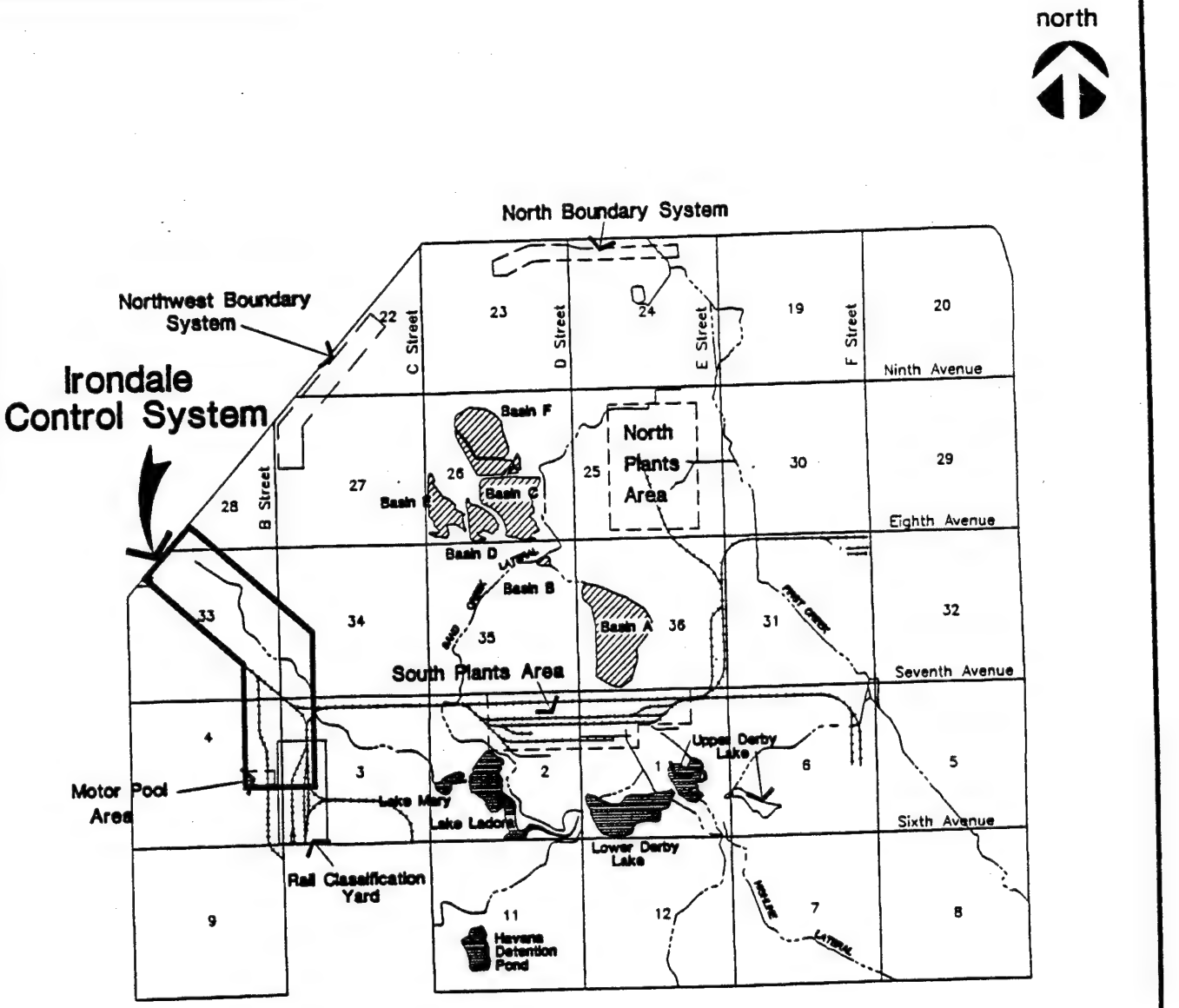

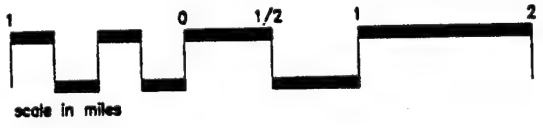

Figure 2

Location Map of Irondale Control System

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ENVIRONMENTAL SERVICES GROUP

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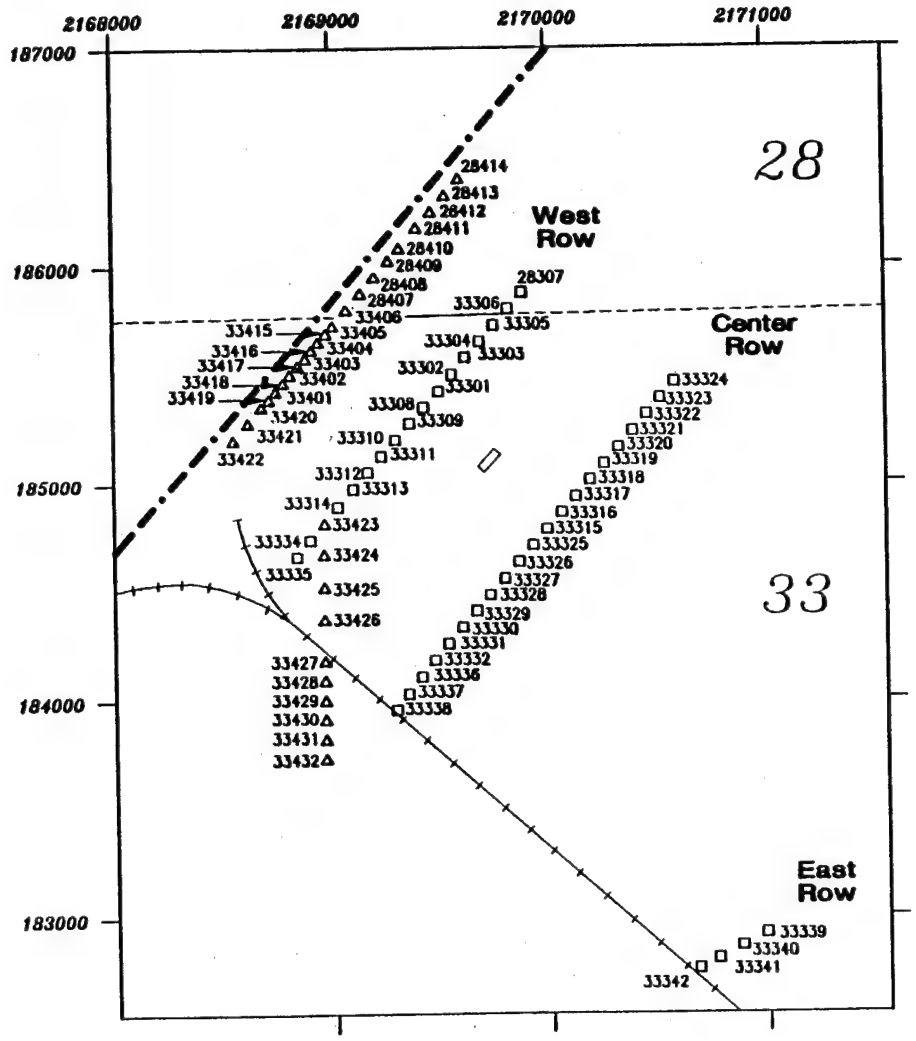

Legend

- Extraction Well
- Recharge Well
- Railroad
- Building
- RMA Boundary
- Section Boundary
- 33 Section Number

Note:
New extraction and recharge wells not operational during the entire year, see Table 1 for startup information.

north

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Figure 3

Irondale Extraction and Recharge System

0 400 800 1600

Scale in Feet

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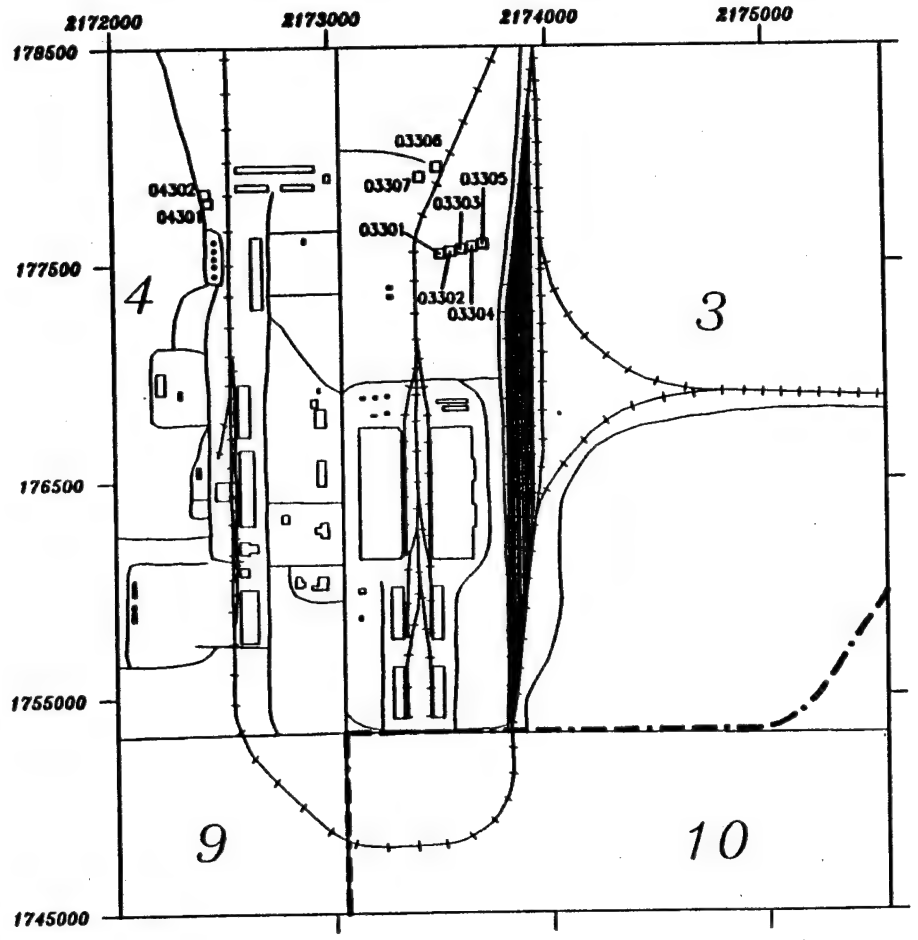

Legend

- Extraction Well
- Recharge Well
- Railroad
- Building
- RMA Boundary
- Section Boundary
- 3 Section Number

Note:
New extraction and recharge wells not operational during the entire year, see Table 1 for sartup information.

north

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ROCKY MOUNTAIN ARSENAL

Figure 4

Rail Classification Yard/
Motor Pool Extraction System

0 400 800 1600
Scale in Feet

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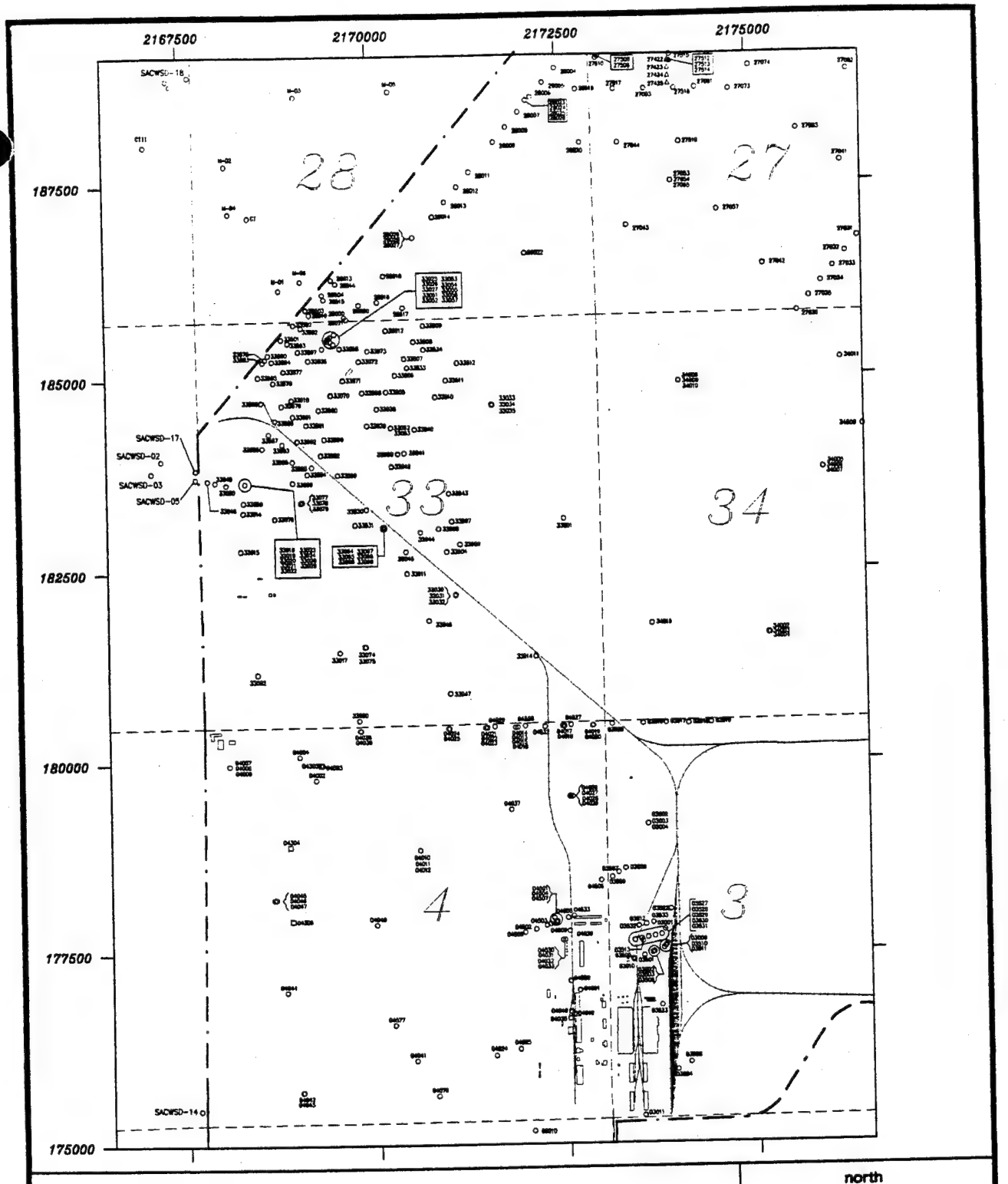

Legend

- Extraction Well
- Monitoring Well
- Recharge Well
- Railroad
- Buildings
- RMA Boundary
- Section Boundary
- 33 Section Number

Note:

Irondale Control System Extraction and Recharge Wells not shown, see Figures 3 and 4.

north

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Figure 5

Well Location Map
1991

0 600 1200 2400
FEET

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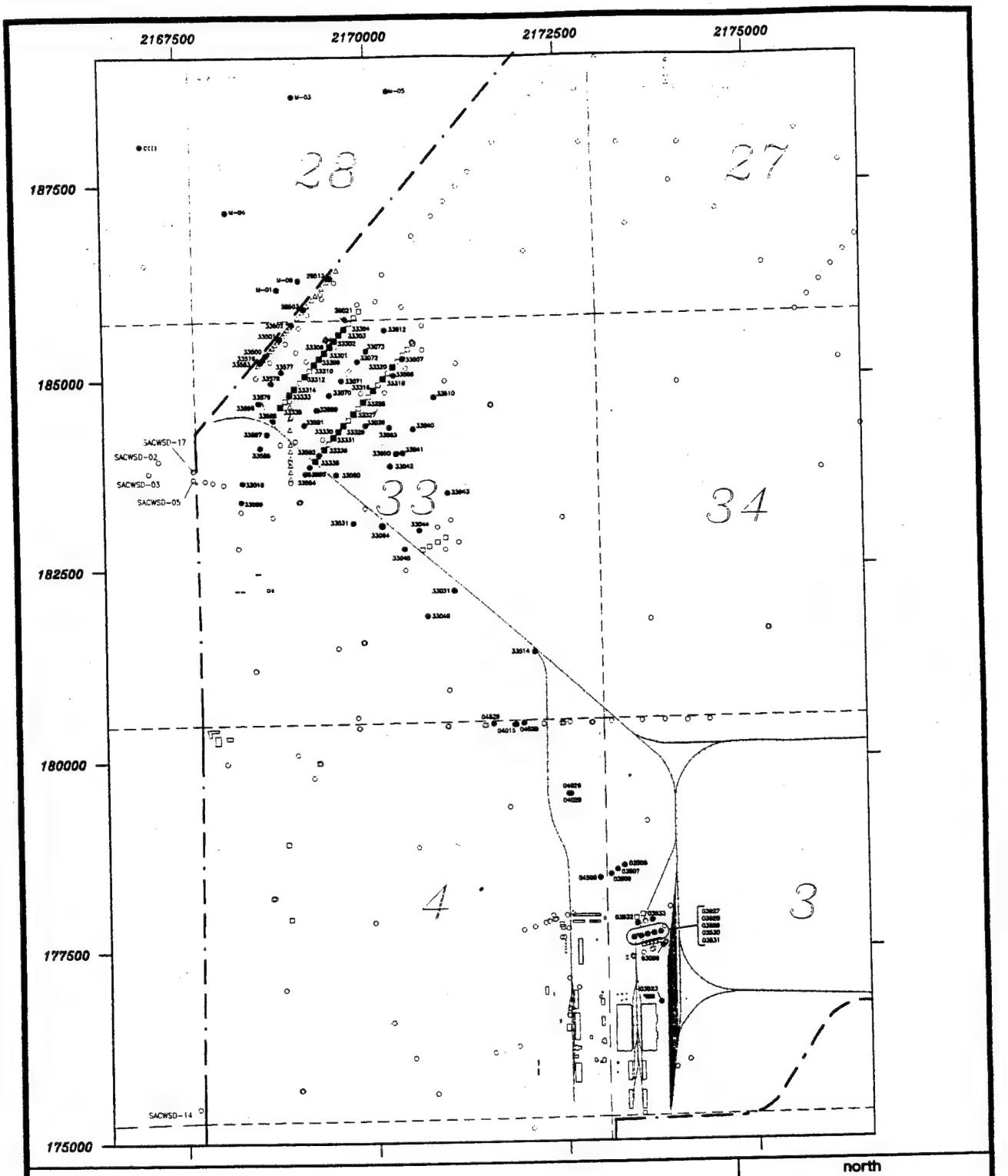

Legend

- Extraction Well
- Monitoring Well
- Recharge Well
- Railroad
- Buildings
- RMA Boundary
- Section Boundary
- 33 Section Number

Measurement Wells

- Extraction Well
- Monitoring Well
- Recharge Well

north

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Figure 6

Irondale Water Quality Monitoring Wells 1991

0 600 1200 2400

FEET

2.0 PURPOSE AND SCOPE

The purpose of this report is to review 1991 operations of the ICS with regard to its effectiveness in preventing groundwater contaminated with DBCP from moving beyond the boundaries of the RMA. Reports presenting evaluations of the ICS from December 1981 through fiscal year 1986 have been prepared by the U. S. Army Engineer Waterways Experimental Station (WES) (RIC 82350R03, 84065R01, 85130R01 and 88195R01). Reports for calendar years 1987 and 1988 have been prepared and issued by Shell. A report for calendar years 1989 and 1990 was prepared by Morrison Knudsen Corporation and issued by Shell.

The geology and hydrology associated with the system and surrounding area were discussed in the December 1984 WES report referenced above, and will not be repeated herein.

3.0 SYSTEM OPERATIONS

Tabulated 1991 weekly average flow rates through the ICS treatment plant are shown in Table 1. Weekly average flow rates are shown graphically in Figure 7. The average flow through the ICS treatment system during 1991 was 1,223 gallons per minute (gpm). The flow varied from a weekly low of 943 gpm to a weekly high of 1,415 gpm. The annual average flow rates increased slightly over the 1990 value of 1,014 gpm. The increase is a result of lower pumping rates by nearby wells owned by SACWSD and by the operation of new extraction wells which are less affected by SACWSD pumping.

A number of modifications to the ICS system configuration were made as part of the Rail Classification Yard/Motor Pool IRA. The modifications consist of the following:

- nine new recharge wells south of the West extraction row;
- conversion of an existing extraction well (33333) in the West row to a recharge well (33423);
- installation of four new extraction wells (East Row) approximately 2,000 feet upgradient (southeast) of the original Irondale system;
- installation of seven extraction wells in the Rail Classification Yard; and
- installation of two extraction wells in the Motor Pool area.

The new recharge wells were installed to enlarge the zone of captured groundwater on the south edge of the ICS by reducing the water table depression within the system caused by high SACWSD pumping. If SACWSD is not stressing the aquifer, then this recharge row creates a reverse gradient towards the center row of extraction wells. The new recharge wells became operational in June 1991.

The four new extraction wells located southwest of the original system were installed in an area of much greater saturated thickness than those in the original system. Typical values of saturated thickness within the original system range from 2 to 10 feet. In the new system, saturated thickness ranges from 15 to 60 feet. These wells are located so that SACWSD pumping will have a minimum effect on the DBCP plume and the treatment plant may operate at a much more consistent rate. The four new extraction wells became operational in April 1991 (Table 2).

The extraction wells in the Rail Classification Yard and Motor Pool intercept DBCP and Trichlorethylene (TCE) plumes, respectively. These wells became operational in September 1991. The goal of these systems is to achieve containment of plumes above target levels and to obtain containment near the contaminant sources. The target level for DBCP is below the Certified Reporting Limit (CRL) and the target level for TCE is the Maximum Contaminant Level (MCL) of 5.0 ug/l.

The ICS treatment plant was modified to accept and control flows from all new and existing components of the ICS system.

The ICS treatment plant treated almost 643 million gallons of water in 1991. The ICS plant operated at stream factors greater than 99 percent for 1991. Table 3 itemizes the periods of

treatment plant downtime in 1991. During 1991 the treatment plant was completely down twenty-one separate times for a total downtime of 80 hours and 15 minutes. Typical downtime was two hours or less. The longest downtime was 35 hours on April 25 and 26. Much of the downtime was required to make modifications to the treatment plant as part of the IRA. Additional downtime was caused as part of the start-up process. Downtime periods as short as those experienced by the ICS treatment plant during 1991 are not thought to be significant relative to interception of the DBCP plume. Even during the 35 hour shutdown in April, the plume could not have traveled more than five to ten feet due to the small water table gradients within the DBCP plume and would have been captured when the system was restarted.

Treatment plant influent and effluent samples were collected and analyzed for DBCP on a biweekly basis during 1991. Results of these analyses are contained in Table 4. The measured influent DBCP concentrations ranged from 0.14 to 0.44 ug/l during 1991. The average influent concentrations increased from about 0.22 ug/l during 1990 to about 0.28 ug/l during 1991. No DBCP was detected in the treatment plant effluent during the entire 1991 period. The increase in influent concentrations is probably due to the installation of the new system components in areas of higher DBCP concentrations. The mass of DBCP removed by the treatment plant for each week is presented in Figure 8. The peaks evident in Figure 8 are directly related to the start-up of the East row of extraction wells in April and the Rail Classification Yard extraction wells in September. Concentrations appear to be continuing to decline after a short interval of operation by the new extraction wells as the contaminant flow reaching the original ICS begins to decline. A total of 1.46 pounds of DBCP was removed during the year.

Treatment plant influent and effluent are sampled on a quarterly basis for TCE. TCE analyses have been conducted at the request of the Army. Results are tabulated in Table 5. The reported data for January 1991 appear to be anomalous. The influent data for Adsorber V-101 is reported at 2.65 ug/l which is 2 to 11 times the reported values in the 1990-91 time period. The influent concentration of TCE for Adsorber V-103 is reported as below the maximum detection limit of 0.10 ug/l and the effluent concentration is 1.43 ug/l. Excluding the anomalous results from the first quarter of 1991, the average influent concentration is 1.19 ug/l and the effluent is below the detection limit of 1.00 ug/l. Approximately 6.4 pounds of TCE were removed during 1991.

During the first part of 1991, Adsorbers V-101 and V-103 were utilized to treat the influent water while Adsorber V-102 was on standby. Beginning February 1991, and throughout the remainder of 1991, Adsorbers V-101 and V-102 were used for water treatment and Adsorber V-103 was shifted to standby status. Carbon was added to the three adsorbers on a number of occasions during 1991. The following amounts were added to each adsorber:

- Adsorber V-101 - 32,000 pounds
- Adsorber V-102 - 11,400 pounds
- Adsorber V-103 - 9,600 pounds

Each pound of carbon treated approximately 12,000 gallons of water.

The West and Central rows of extraction wells were operated differently in 1991 than in previous years. Modeling of the system during the final engineering design phase of the IRA demonstrated that turning the West row of extraction wells off would decrease the tendency for DBCP to be pulled through the

Central row and would possibly create a reverse gradient from the recharge wells into the Central extraction row. Similarly, wells at the extreme ends of the Central extraction row tend to smear the plume, making complete capture more difficult. These wells were gradually turned off throughout 1991. The water table was closely monitored after wells were turned off to check for adverse effects on the DBCP plume. The West row was completely turned off by December 1991 (Table 2). Only 13 wells out of 21 in the Central row were operating at the end of 1991.

TABLE 1
IRONDALE CONTROL SYSTEM
TOTAL FLOW THROUGH ADSORBERS
1991 WEEKLY AVERAGES

WEEK ENDING	FLOW (GPM)	WEEK ENDING	FLOW (GPM)
01/04/91	1,199	07/05/91	1,200
01/11/91	1,219	07/12/91	1,185
01/18/91	1,243	07/19/91	1,169
01/25/91	1,259	07/26/91	1,174
02/01/91	1,287	08/02/91	1,086
02/08/91	1,325	08/09/91	1,027
02/15/91	1,374	08/16/91	1,001
02/22/91	1,361	08/23/91	994
03/01/91	1,340	08/30/91	943
03/08/91	1,333	09/06/91	1,013
03/15/91	1,224	09/13/91	1,056
03/22/91	1,252	09/20/91	1,160
03/29/91	1,309	09/27/91	996
04/05/91	1,237	10/04/91	1,252
04/12/91	1,334	10/11/91	1,222
04/19/91	1,295	10/18/91	1,148
04/26/91	1,313	10/25/91	1,192
05/03/91	1,107	11/01/91	1,298
05/10/91	1,164	11/08/91	1,309
05/17/91	1,228	11/15/91	1,231
05/24/91	1,220	11/22/91	1,328
05/31/91	1,218	11/29/91	1,336
06/07/91	1,238	12/06/91	1,354
06/14/91	1,231	12/13/91	1,389
06/21/91	1,214	12/20/91	1,402
06/28/91	1,200	12/27/91	1,415

AVERAGE FLOW =	1,223
MAXIMUM FLOW =	1,415
MINIMUM FLOW =	943

TABLE 2
IRONDALE BOUNDARY EXTRACTION SYSTEM
1991 WEEKLY AVERAGE FLOWS
(GPM)

WEEK ENDING	CENTER ROW	WEST ROW	EAST ROW	RY(1) ROW	MP(2) ROW	METERED TOTAL	UNMETERED FLOW (3)	ESTIMATED TOTAL
04-Jan-91	528	609				1,138	19	1,157
11-Jan-91	514	608				1,122	19	1,141
18-Jan-91	499	638				1,138	34	1,172
25-Jan-91	508	641				1,150	34	1,184
01-Feb-91	520	646				1,166	34	1,200
08-Feb-91	518	657				1,175	34	1,209
15-Feb-91	568	667				1,236		1,236
22-Feb-91	469	666				1,135	101	1,236
01-Mar-91	478	680				1,158	101	1,259
08-Mar-91	585	678				1,262		1,262
15-Mar-91	564	582				1,146		1,146
22-Mar-91	607	611				1,217		1,217
29-Mar-91	561	633	56			1,249		1,249
05-Apr-91	473	552	203			1,227		1,227
12-Apr-91	418	450	347			1,215		1,215
19-Apr-91	429	385	422			1,236		1,236
26-Apr-91	371	312	359			1,043		1,043
03-May-91	454	316	267			1,037	56	1,093
10-May-91	454	379	349			1,182		1,182
17-May-91	448	387	414			1,250		1,250
24-May-91	434	360	446			1,241		1,241
31-May-91	427	298	508			1,234		1,234
07-Jun-91	433	307	517			1,257		1,257
14-Jun-91	433	297	519			1,248		1,248
21-Jun-91	381	291	562			1,234		1,234
28-Jun-91	334	281	609			1,224		1,224
05-Jul-91	324	260	647			1,231		1,231
12-Jul-91	316	260	645			1,221		1,221
19-Jul-91	310	260	634			1,204		1,204
26-Jul-91	308	261	636			1,206		1,206
02-Aug-91	300	216	586			1,102	49	1,151
09-Aug-91	313	162	599			1,074		1,074
16-Aug-91	332	109	600			1,041		1,041
23-Aug-91	334	104	580			1,018		1,018
30-Aug-91	331	65	580			976		976
06-Sep-91	337	67	601			1,004		1,004
13-Sep-91	329	0	583	202	53	1,167		1,167
20-Sep-91	337	57	582	194	51	1,221		1,221
27-Sep-91	340	66	585	28	7	1,027		1,027
04-Oct-91	342	67	600	226	60	1,294		1,294
11-Oct-91	311	67	599	225	59	1,261		1,261

TABLE 2
IRONDALE BOUNDARY EXTRACTION SYSTEM
1991 WEEKLY AVERAGE FLOWS
(GPM)

WEEK ENDING	CENTER ROW	WEST ROW	EAST ROW	RY(1) ROW	MP(2) ROW	METERED TOTAL	UNMETERED FLOW (3)	ESTIMATED TOTAL
18-Oct-91	357	66	600	128	34	1,185	47	1,232
25-Oct-91	357	67	621	132	35	1,211	24	1,235
01-Nov-91	363	67	582	224	60	1,296	58	1,355
08-Nov-91	375	67	583	222	60	1,306	61	1,367
15-Nov-91	383	67	584	145	39	1,217	61	1,278
22-Nov-91	390	67	585	223	59	1,325	61	1,386
29-Nov-91	399	66	581	224	60	1,330	60	1,390
06-Dec-91	409	48	584	238	72	1,350	61	1,412
13-Dec-91	423	0	582	273	104	1,383	62	1,444
20-Dec-91	438	0	582	271	105	1,396	63	1,459
27-Dec-91	452	0	582	271	104	1,409	63	1,472
03-Jan-92	453	0	583	266	104	1,405	63	1,468

(1) RY - Rail Classification Yard
(2) MP - Motor Pool
(3) An estimate of flow through occasionally non-functioning water meters.

TABLE 3
IRONDALE CONTROL SYSTEM
TREATMENT PLANT DOWNTIME
1991

DATE	DOWNTIME
March 14	9 hours
April 25 & 26	35 hours
May 6	3 hours, 15 minutes
May 28	4 hours, 45 minutes
July 18	5 minutes
July 20	10 minutes
August 1	2 hours, 35 minutes
August 4	~5 minutes
August 19	15 minutes
August 20	4 hours, 35 minutes
August 28	2 hours
August 29	3 hours
September 10	~4 hours, 25 minutes
September 11	1 hour, 5 minutes
September 14	1 hour, 30 minutes
September 16	1 hour, 30 minutes
September 17	1 hour, 25 minutes
September 24	~2 hours
October 12	2 hours
October 15	~1 hour, 5 minutes
October 18	30 minutes

TABLE 4
IRONDALE CONTROL SYSTEM
ADSORBER INFLUENT AND EFFLUENT DBCP CONCENTRATIONS
1991

Date Sampled	Adsorber V-101 Influent (ug/l)	Adsorber V-101 Effluent (ug/l)	Adsorber V-102 Influent (ug/l)	Adsorber V-102 Effluent (ug/l)	Adsorber V-103 Influent (ug/l)	Adsorber V-103 Effluent (ug/l)
01/14/91	0.18	LT 0.06			0.14	LT 0.06
01/28/91	0.20	LT 0.06			0.18	LT 0.06
02/11/91	0.16	LT 0.06			0.14	LT 0.06
02/25/91	0.18	LT 0.06	0.16	LT 0.06		
03/11/91	0.19	LT 0.06	0.18	LT 0.06		
03/25/91	0.21	LT 0.06	0.18	LT 0.06		
04/08/91	0.34	LT 0.06	0.44	LT 0.06		
04/22/91	0.36	LT 0.06	0.34	LT 0.06		
05/06/91	0.32	LT 0.06	0.34	LT 0.06		
05/20/91	0.37	LT 0.06	0.39	LT 0.06		
06/03/91	0.36	LT 0.06	0.35	LT 0.06		
06/17/91	0.32	LT 0.06	0.32	LT 0.06		
07/01/91	0.29	LT 0.06	0.32	LT 0.06		
07/15/91	0.28	LT 0.06	0.31	LT 0.06		
07/29/91	0.29	LT 0.06	0.30	LT 0.06		
08/12/91	0.28	LT 0.06	0.31	LT 0.06		
08/26/91	0.28	LT 0.06	0.29	LT 0.06		
09/09/91	0.29	LT 0.06	0.29	LT 0.06		
09/22/91	0.26	LT 0.06	0.27	LT 0.06		
10/07/91	0.35	LT 0.06	0.37	LT 0.06		
10/21/91	0.28	LT 0.06	0.32	LT 0.06		
11/04/91	0.32	LT 0.06	0.33	LT 0.06		
11/18/91	0.30	LT 0.06	0.28	LT 0.06		
12/02/91	0.27	LT 0.06	0.25	LT 0.06		
12/16/91	0.22	LT 0.06	0.20	LT 0.06		
12/30/91	0.18	LT 0.06	0.16	LT 0.06		

1991 Summary of Influent Concentrations (ug/l)

	Min	Max	Average
V-101	0.16	0.37	0.27
V-102/V-103	0.14	0.44	0.28

TABLE 5
IRONDALE CONTROL SYSTEM
ADSORBER INFLUENT AND EFFLUENT TCE CONCENTRATIONS
1991

Date Sampled	Adsorber V-101		Adsorber V-102		Adsorber V-103	
	Influent (ug/l)	Effluent (ug/l)	Influent (ug/l)	Effluent (ug/l)	Influent (ug/l)	Effluent (ug/l)
01/08/91	2.65	0.45			LT 0.10*	1.43*
04/03/91	LT 1.00	LT 1.00	LT 1.00	LT 1.00		
07/12/91	1.13	LT 1.00	1.16	LT 1.00		
10/09/91	1.23	LT 0.10	1.22	LT 0.10		

* Values appear to anomalous.

TABLE 6
IRONDALE CONTROL SYSTEM
CARBON ADDITIONS TO ADSORBERS
1991

DATE	ABSORBER	CARBON ADDED (lbs.)
January 3	V103	3,200
January 24	V103	3,200
January 31	V101	3,200
February 7	V103	3,200
April 4	V101	3,200
May 23	V101	3,200
July 15	V101	3,200
September 13	V101	3,200
September 26	V101	3,200
October 28	V102	3,200
October 31	V102	1,800
November 5	V101	3,200
November 25	V102	3,200
November 27	V101	3,200
December 5	V101	3,200
December 9	V102	3,200
December 23	V101	3,200
	TOTAL	53,000

IRONDALE CONTROL SYSTEM
TOTAL FLOW THROUGH ADSORBERS
1991 WEEKLY AVERAGES

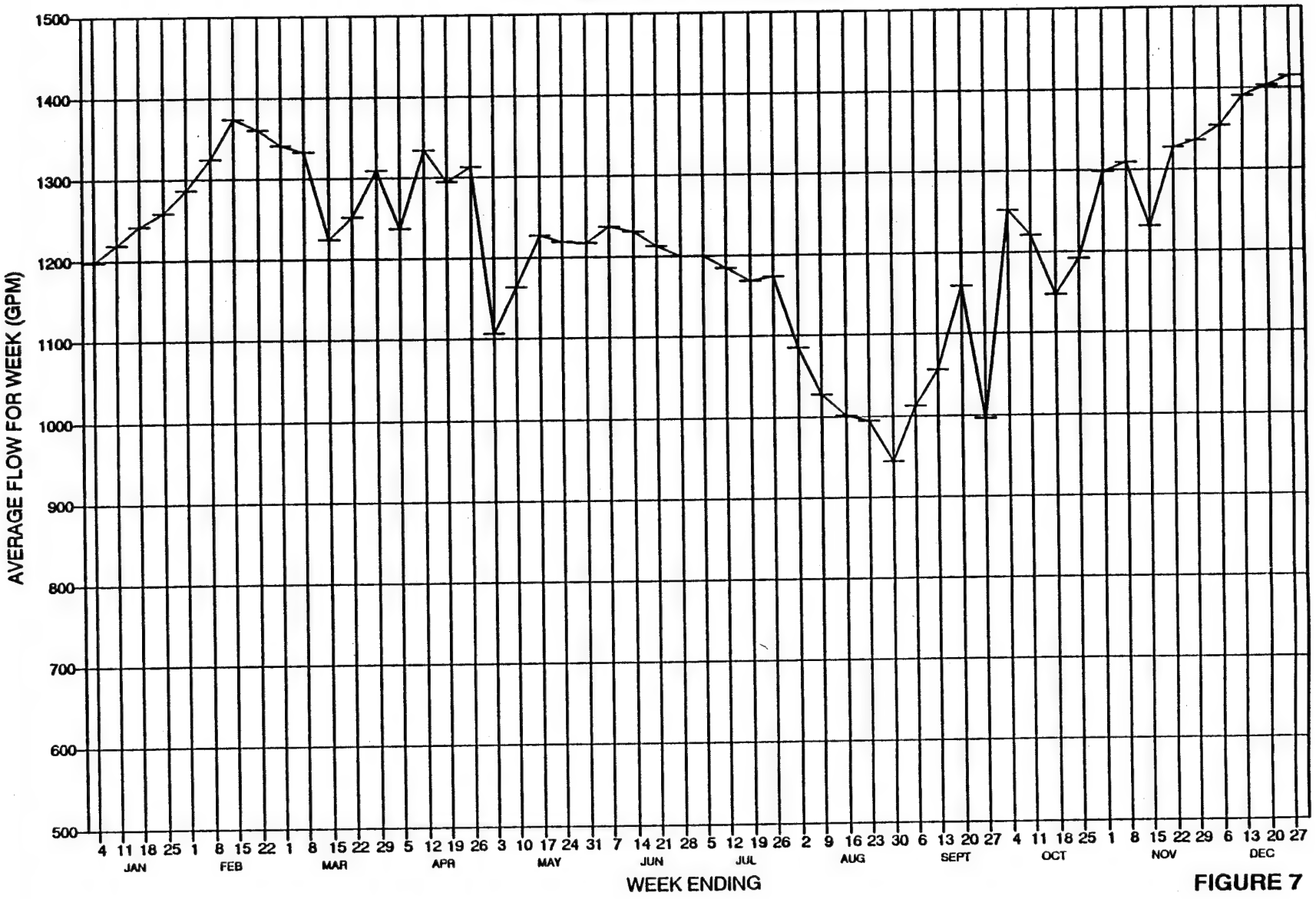


FIGURE 7

IRONDALE CONTROL SYSTEM
MASS OF DBCP REMOVED

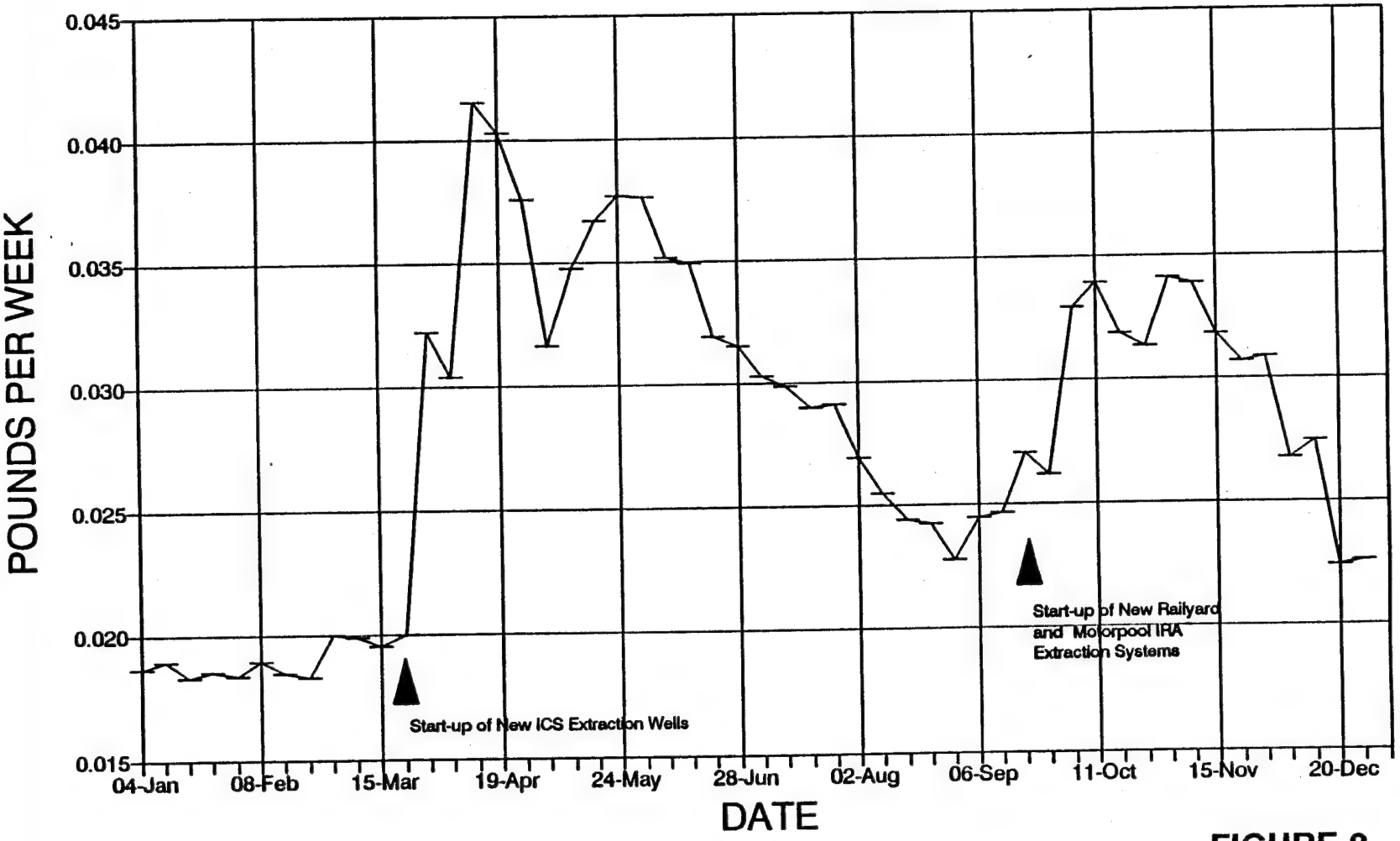


FIGURE 8

4.0 DATA EVALUATION

4.1 Water Table

A quarterly water table monitoring program was conducted during 1991. Water level measurements were collected for a large number of wells in the vicinity of the DBCP plume extending from the ICS roughly two miles up gradient to the Rail Classification Yard in Section 3. The water level data were collected during the months of January, April, July, and October. The water level data (tabulated in Appendix A), have been used in preparing quarterly water table contour maps for the area through which the DBCP plume extends. These maps are contained in Figures 9, 11, 13 and 15.

The January and April water tables are similar to those of previous years, showing substantial recovery from the stresses of SACWSD pumping of the previous summer. In July and October the impacts of the IRA improvements were readily noticeable. A groundwater mound had formed creating both a divide along the alignment of the new recharge wells and a reverse gradient into the Central row of extraction wells. The four new extraction wells had created a depression in the water table.

4.2 DBCP Isoconcentration Maps

A quarterly water quality monitoring program was conducted during 1991. Water quality samples were collected and analyzed for DBCP for a large number of wells in the vicinity of the ICS and along the DBCP plume extending from the ICS roughly two miles upgradient to the Rail Classification Yard in Section 3 (Figure 6). The quarterly sampling was conducted during January, April, July, and October. The DBCP data, which are tabulated in

Appendix B, have been used in preparing quarterly DBCP plume maps which are contained in Figures 10, 12, 14 and 16.

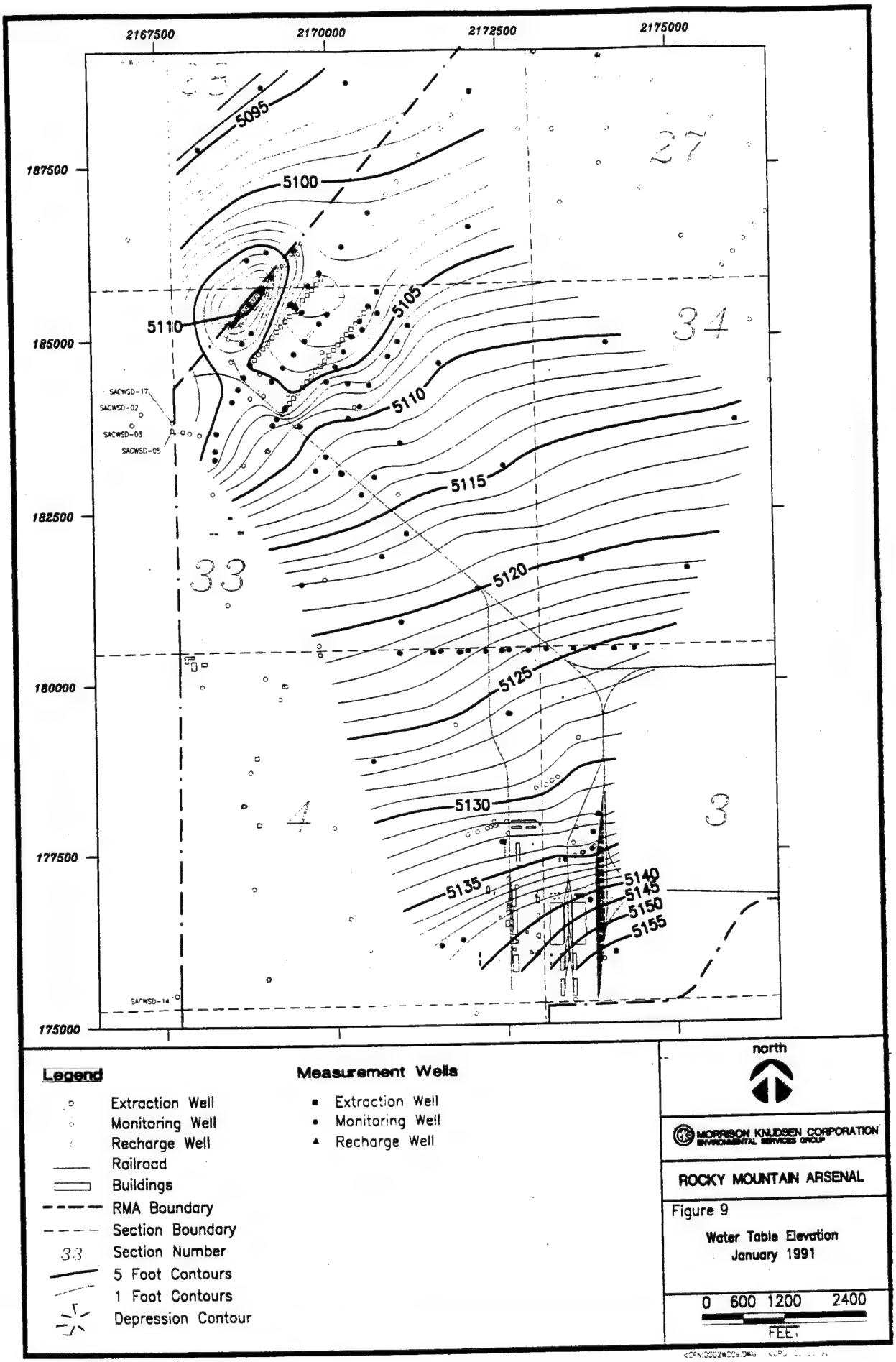
The highest concentration of DBCP in the groundwater sampling was in Well 03523 in the Rail Classification Area where concentrations were 29 ug/l in the third quarter of 1991. Concentrations along the plume decrease towards the ICS where measured concentrations within the plume were always under 2 ug/l during the 1991 period.

The January and April data show DBCP in some of the monitoring wells at the south end of the West row of extraction wells. The presence of DBCP in this part of the system is due to the cone of depression caused by heavy SACWSD pumping during the previous summer. Very low groundwater gradients in this area prevent rapid migration of DBCP either towards ICS extraction wells or beyond the system. Any DBCP drawn into the SACWSD wells would have been treated with the SACWSD carbon adsorption systems.

The July and October DBCP data show that the modifications made to the ICS as part of the IRA are now functioning as intended. DBCP is confined to the extraction well system, even during periods of high pumping by SACWSD.

4.3 TCE Data

Five monitoring wells near the Irondale boundary were sampled in January and again in February. The maximum reported value is 19.2 ug/l in Well 33584. Sampling results for TCE are provided in Appendix C.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187500
185000
182500
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177500
175000
5095
5100
5105
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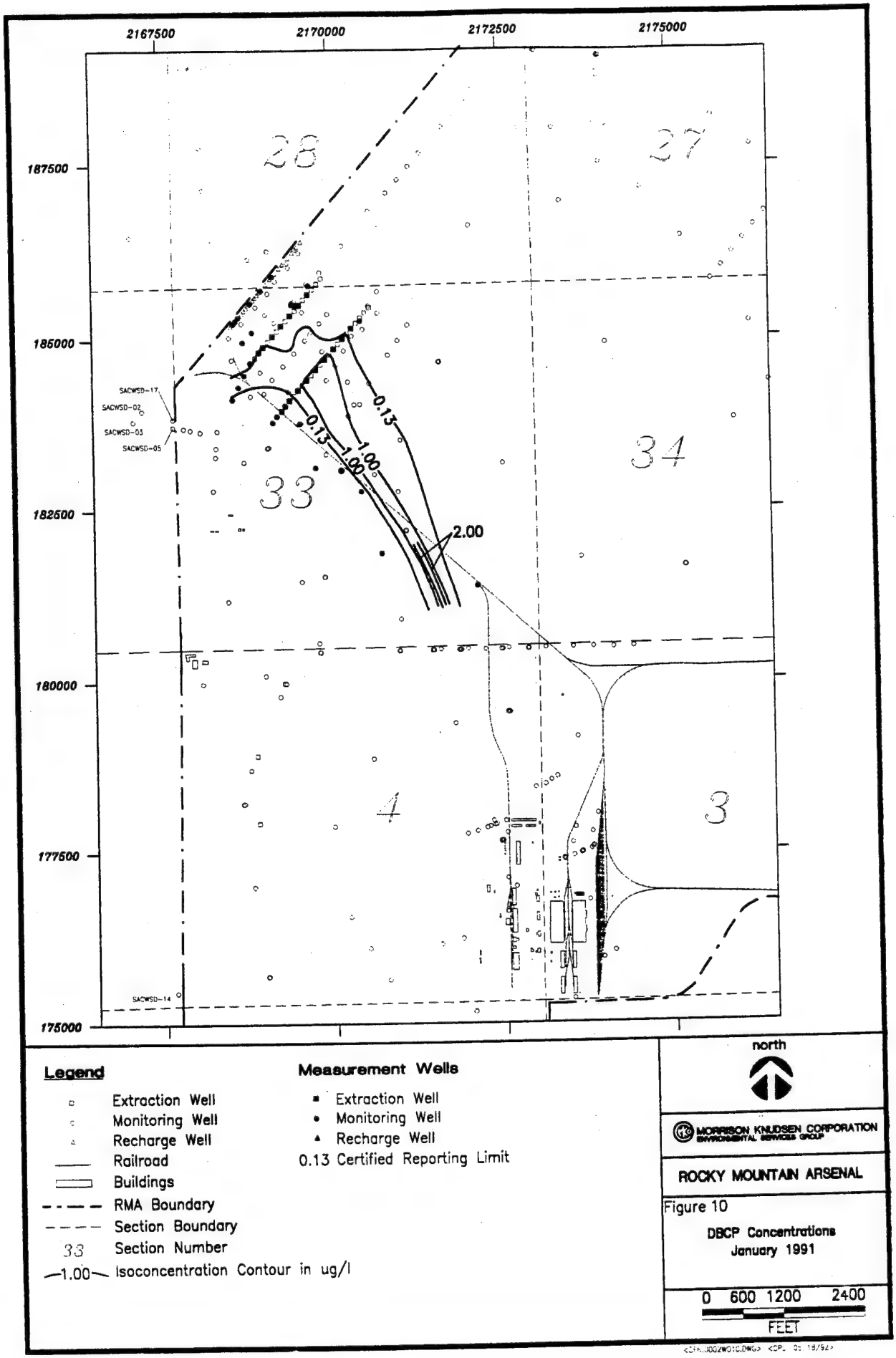
5120
5125
5130
5135
5140
5145
5150
5155
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
33
27
34
4
3
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
5 Foot Contours
1 Foot Contours
Depression Contour
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 9
Water Table Elevation
January 1991
0 600 1200 2400
FEET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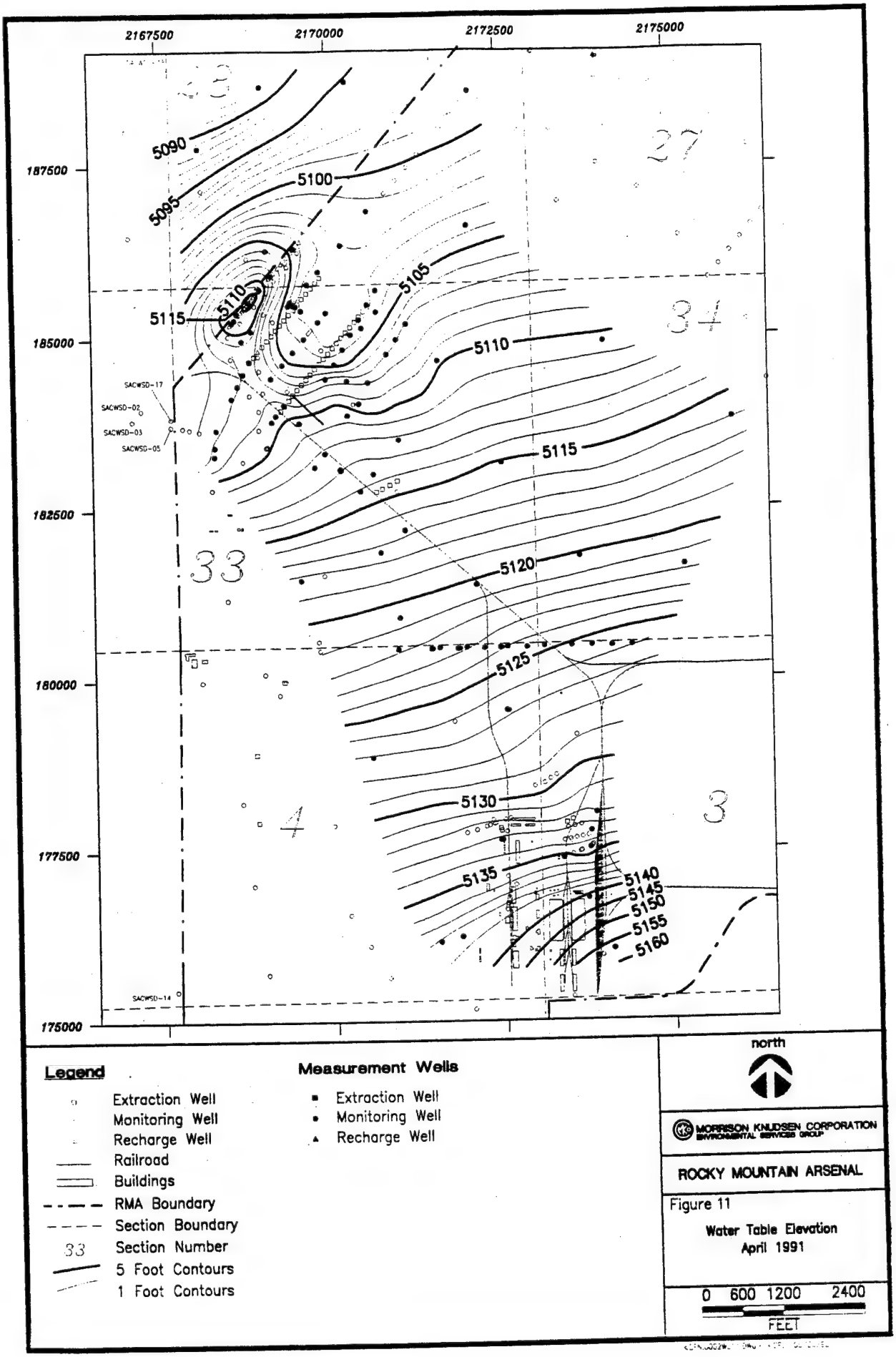
2175000
187500
185000
182500
180000
177500
175000
28
27
34
33
4
3
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
0.13
0.13
1.00
1.00
2.00
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
1.00 Isoconcentration Contour in ug/l
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
0.13 Certified Reporting Limit
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 10
DBCP Concentrations
January 1991
0 600 1200 2400
FEET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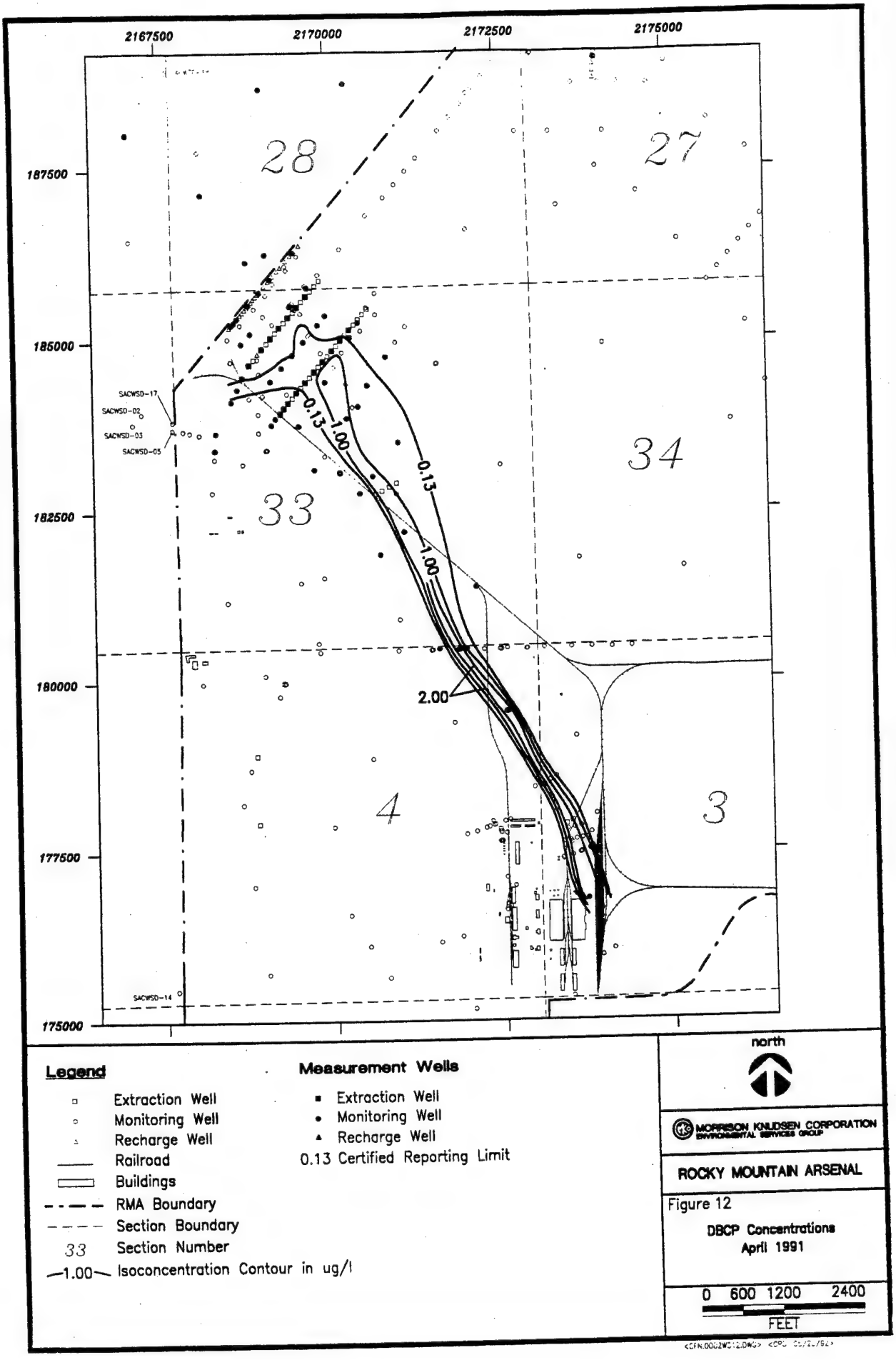
5140
5145
5150
5155
5160
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
33
4
3
27
34
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
5 Foot Contours
1 Foot Contours
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 11
Water Table Elevation
April 1991
0 600 1200 2400
FEET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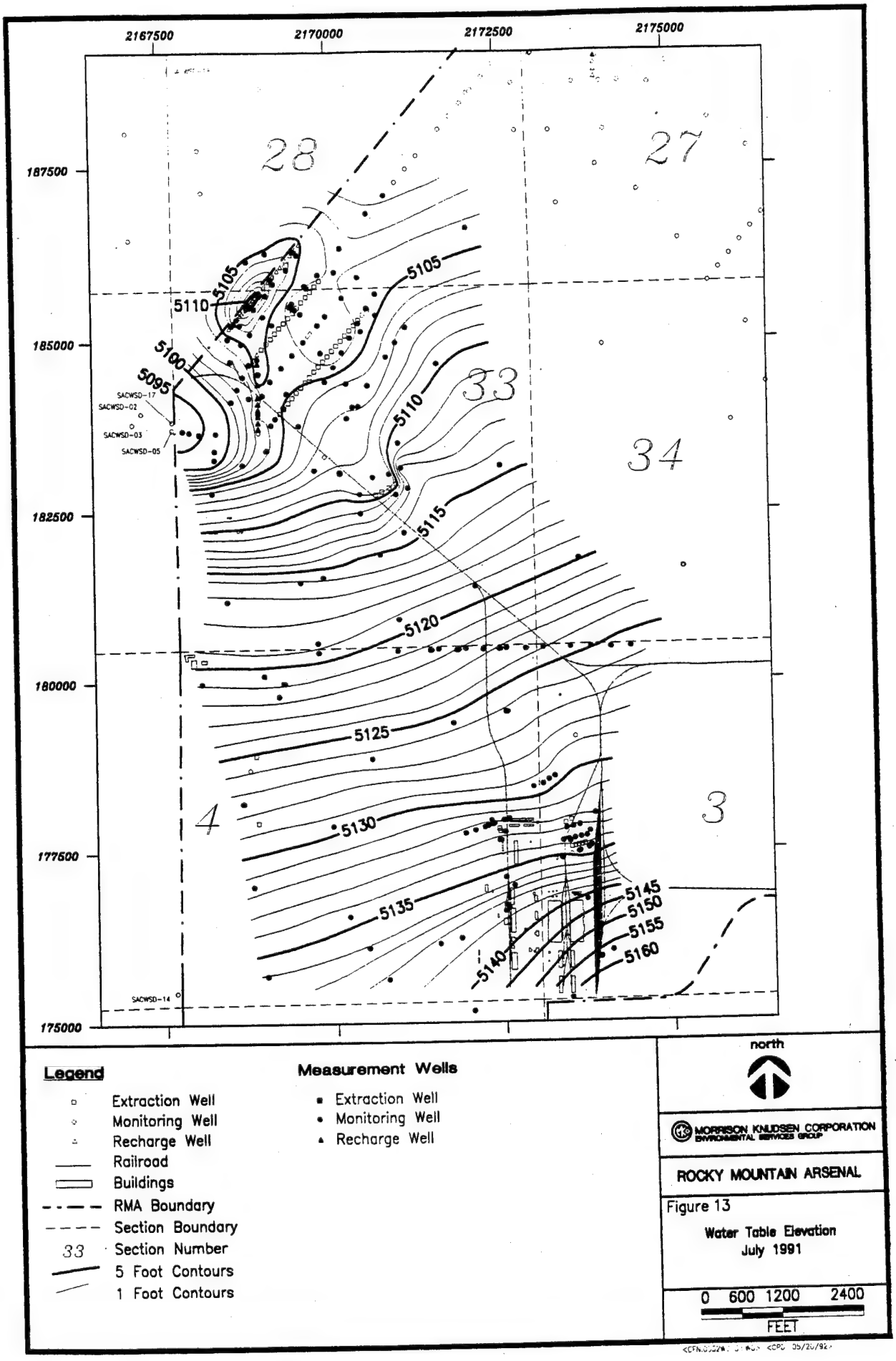
2170000
2172500
2175000
187500
185000
182500
180000
177500
175000
28
27
34
33
4
3
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
0.13
1.00
0.13
1.00
2.00
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
1.00 Isoconcentration Contour in ug/l
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
0.13 Certified Reporting Limit
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 12
DBCP Concentrations
April 1991
0 600 1200 2400
FEET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2172500
2175000
187500
185000
182500
180000
177500
175000
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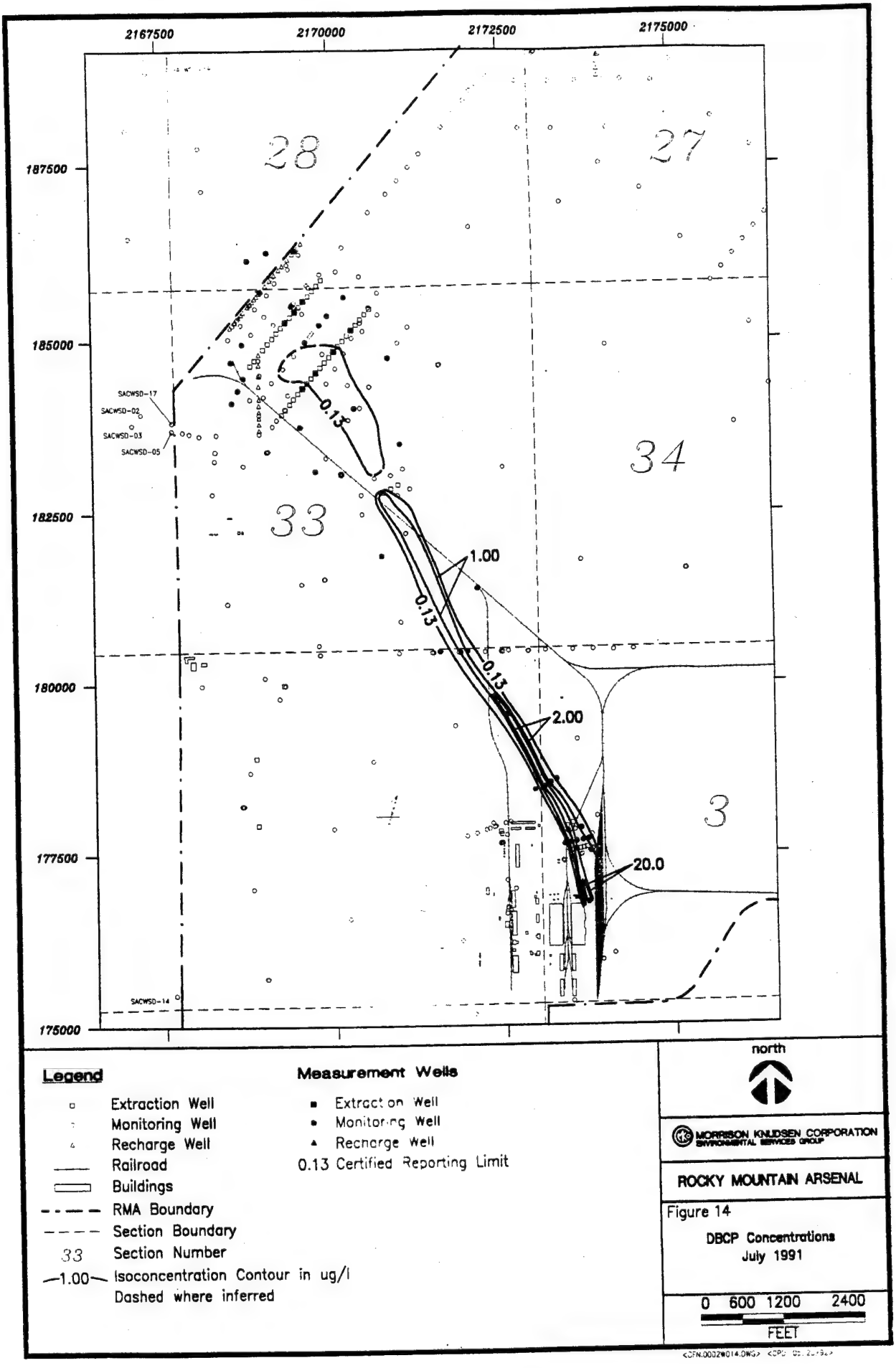
27
33
34
4
3
5105
5110
5100
5095
5115
5120
5125
5130
5135
5140
5145
5150
5155
5160
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
5 Foot Contours
1 Foot Contours
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 13
Water Table Elevation
July 1991
0 600 1200 2400
FEET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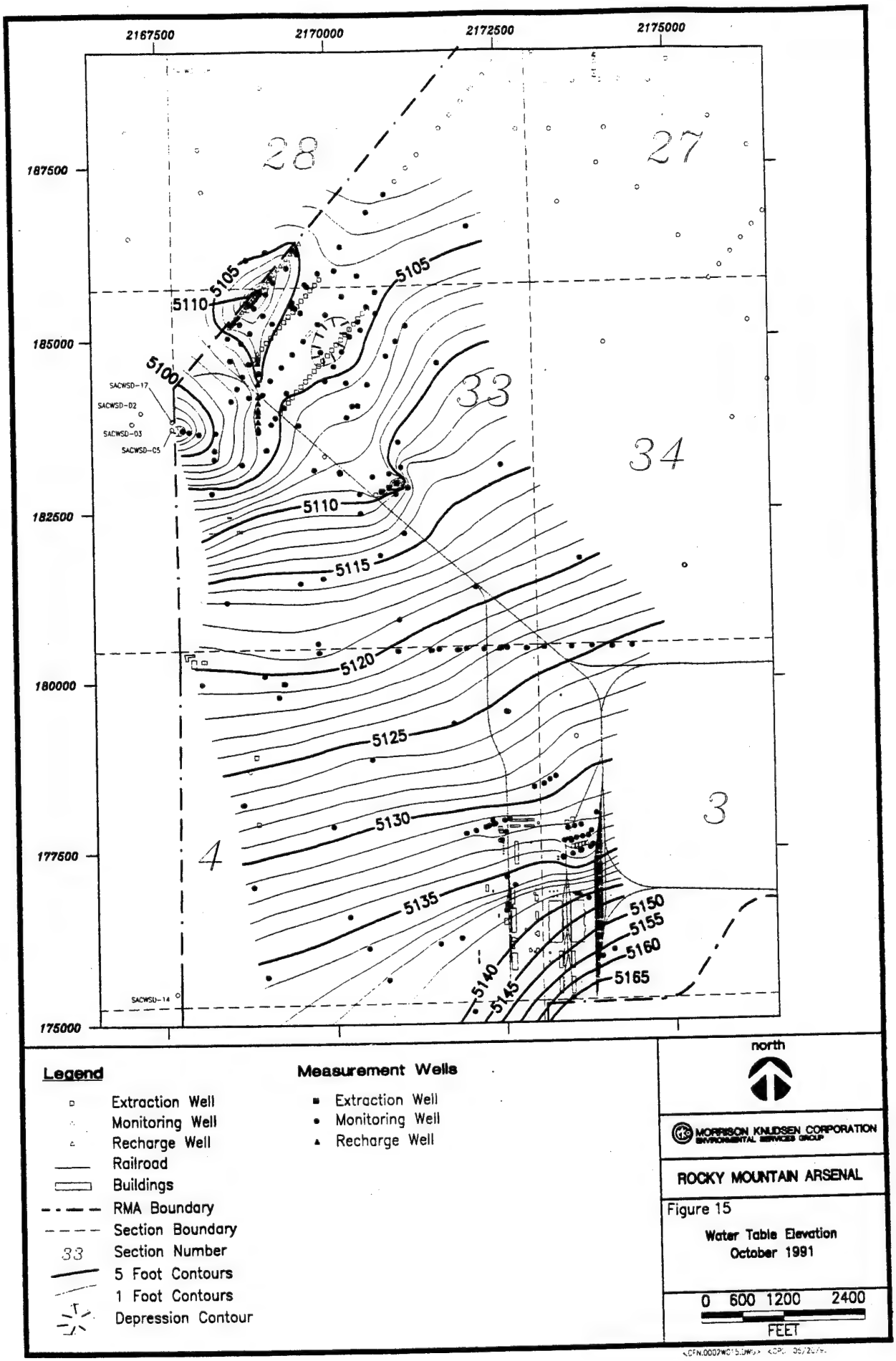
2172500
2175000
187500
185000
182500
180000
177500
175000
28
27
34
33
3
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
0.13
1.00
0.13
0.13
2.00
20.0
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
1.00 Isoconcentration Contour in ug/l
Dashed where inferred
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
0.13 Certified Reporting Limit
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 14
DBCP Concentrations
July 1991
0 600 1200 2400
FEET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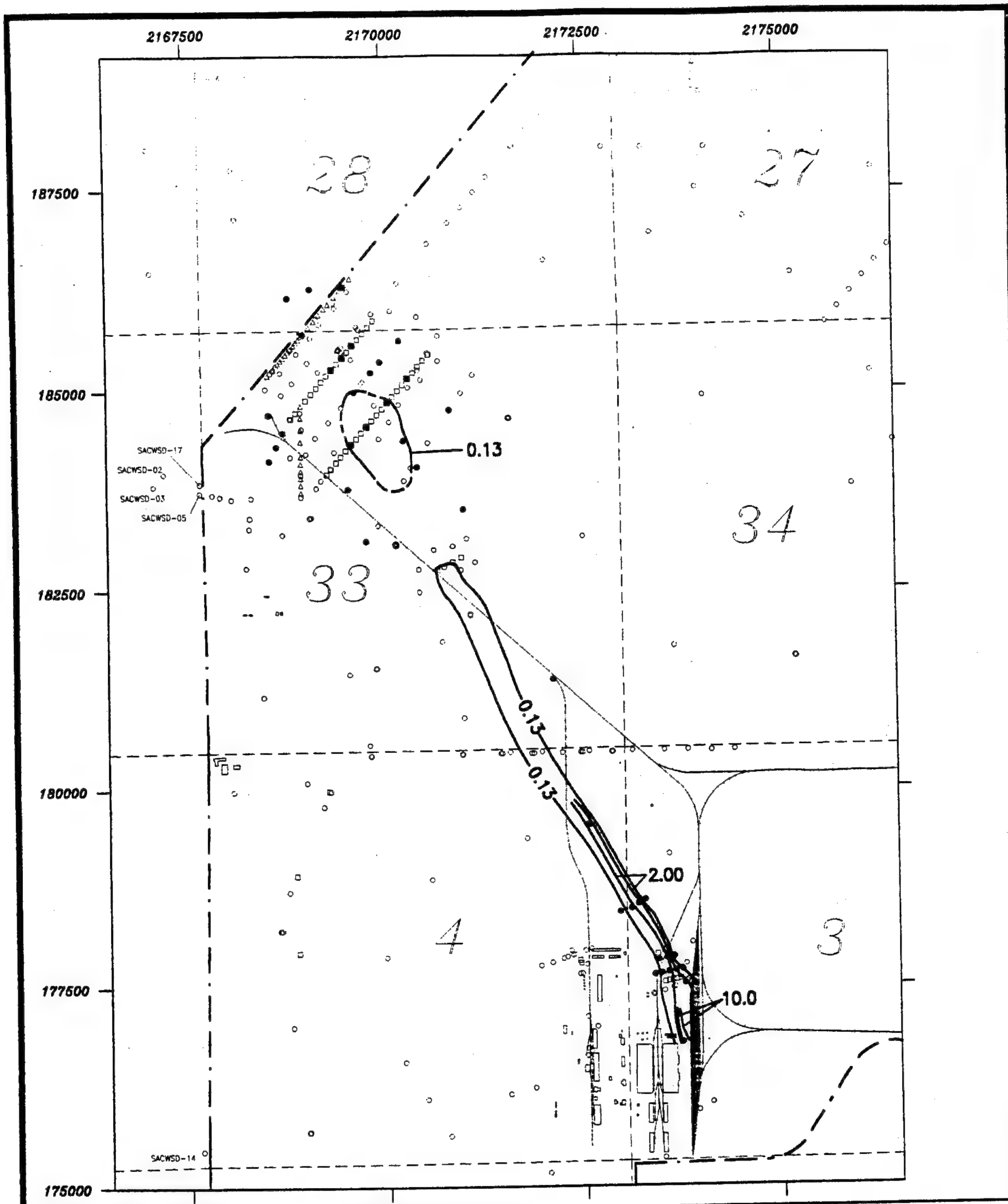
5150
5155
5160
5165
SACWSD-17
SACWSD-02
SACWSD-03
SACWSD-05
SACWSD-14
Legend
Extraction Well
Monitoring Well
Recharge Well
Railroad
Buildings
RMA Boundary
Section Boundary
33 Section Number
5 Foot Contours
1 Foot Contours
Depression Contour
Measurement Wells
Extraction Well
Monitoring Well
Recharge Well
north
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP
ROCKY MOUNTAIN ARSENAL
Figure 15
Water Table Elevation
October 1991
0 600 1200 2400
FEET



Legend

- Extraction Well
- Monitoring Well
- Recharge Well
- Railroad
- Buildings
- RMA Boundary
- Section Boundary
- 33 Section Number
- —1.00— Isoconcentration Contour in ug/l, Dashed where Inferred

Measurement Wells

- ■ Extraction Well
- ● Monitoring Well
- ▲ Recharge Well

0.13 Certified Reporting Limit

north

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

ROCKY MOUNTAIN ARSENAL

Figure 16

DBCP Concentrations
October 1991

0 600 1200 2400
FEET

5.0 CONCLUSIONS

The ICS treatment system performed well during the 1991 period. The treatment plant stream factors were greater than 99 percent for the year. The treatment plant effectively removed DBCP to below detectable levels.

The DBCP plume continues to appear to decrease in concentration although the average influent concentration of DBCP has increased from 0.22 ug/l in 1990 to 0.28 ug/l in 1991. This increase is due to the operation of the new extraction wells installed as part of the Rail Classification Yard/Motor Pool IRA. Influent concentrations began to decline again in November and December.

The Rail Classification Yard/Motor Pool Area IRA improvements were completed in 1991. Four new extraction wells located approximately 2,000 feet upgradient of the existing ICS system began pumping in late April. New recharge wells began operating in June. All improvements to the system were completed and operating in September 1991.

The alluvial aquifer exhibited approximately the same general flow patterns in 1991 as in previous years. SACWSD pumping was not as great in 1991 as in 1990. Low levels of DBCP was detected in monitoring wells at the south end of the system during 1990 and the first part of 1991. It is likely that the presence of DBCP in this area was caused by heavy SACWSD pumping in 1990, and that very low groundwater gradients in this part of the system prevented rapid movement of the DBCP out of the system. The extremely low levels of DBCP which may have entered the SACWSD system during 1991 were treated by the adsorbers at the SACWSD water treatment plant.

During the latter half of 1991 both the improvements to the ICS installed as part of the IRA and changes in operating procedures resulted in no measurable bypass of DBCP.

APPENDIX A

TABLE A-1

WATER LEVEL MEASUREMENTS
JANUARY 7, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
03001	75.86	5134.44	5210.30	
03002	67.70	5128.72	5196.42	
03005	21.93	5175.28	5197.21	
03008	63.58	5157.00	5220.58	
03009	78.41	5132.33	5210.74	
03010	71.17	5135.05	5206.22	
03516	63.12	5124.78	5187.90	
03517	57.00	5125.14	5182.14	
03518	48.88	5125.25	5174.13	
03519	59.83	-	5185.42	BELOW SCREEN
03522	72.38	5131.82	5204.20	
03523	66.16	5140.32	5206.48	
03526	62.83	5124.45	5187.28	
04010	68.75	5126.82	5195.57	
04013	70.25	5122.46	5192.71	
04017	63.62	5123.58	5187.20	
04019	63.17	5124.04	5187.21	
04021	71.31	5122.01	5193.32	
04024	71.25	5121.32	5192.57	
04026	65.75	5126.46	5192.21	
04030	66.10	5133.15	5199.25	
04524	61.05	5138.18	5199.23	
04525	62.38	5138.68	5201.06	
04527	63.52	5123.69	5187.21	
04528	69.24	5122.61	5191.85	
04529	71.22	5122.05	5193.27	
04532	65.24	5124.21	5189.45	
28018	47.30	5101.46	5148.76	
28020	41.82	5102.04	5143.86	
28021	42.81	5101.53	5144.34	
28022	34.70	5108.88	5143.58	
28023	35.77	5098.53	5134.30	
28027	39.40	5101.19	5140.59	
28503	48.17	5107.37	5155.54	
28513	36.93	5103.85	5140.78	
33001	54.84	5114.92	5169.76	
33014	54.62	5105.60	5160.22	
33017	-	-	5175.02	DRY
33018	63.53	5105.17	5168.70	
33025	54.21	5102.66	5156.87	
33030	57.48	5116.60	5174.08	
33033	40.91	5109.69	5150.60	
33038	67.32	5104.23	5171.55	

TABLE A-1 (Continued)

WATER LEVEL MEASUREMENTS
JANUARY 7, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
33039	53.00	5106.41	5159.41	
33040	73.58	5107.42	5181.00	
33041	69.30	5108.58	5177.88	
33042	54.95	5109.93	5164.88	
33043	59.41	5111.98	5171.39	
33044	61.92	5113.17	5175.09	
33045	63.84	5113.53	5177.37	
33046	58.84	5117.12	5175.96	
33047	70.05	5120.34	5190.39	
33051	54.46	5102.68	5157.14	
33055	53.88	5102.48	5156.36	
33056	51.52	5102.09	5153.61	
33057	50.11	5101.59	5151.70	
33058	46.93	5101.71	5148.64	
33059	57.08	5105.72	5162.80	
33060	51.50	5109.04	5160.54	
33062	68.34	5107.02	5175.36	
33064	50.93	5112.31	5163.24	
33070	51.28	5103.80	5155.08	
33071	50.24	5102.86	5153.10	
33072	51.05	5102.11	5153.16	
33073	43.35	5102.01	5145.36	
33500	42.39	5109.63	5152.02	
33501	33.80	5117.86	5151.66	
33502	45.75	5113.80	5159.55	
33505	62.74	5103.33	5166.07	
33506	45.57	5102.94	5148.51	
33507	43.56	5102.12	5145.68	
33508	-	-	5156.29	DRY
33509	46.22	5102.86	5149.08	
33510	47.10	5106.51	5153.61	
33511	45.93	5106.53	5152.46	
33512	48.46	5106.81	5155.27	
33514	56.88	5119.94	5176.82	
33530	-	-	5167.57	DRY
33531	52.88	5111.38	5164.26	
33533	43.77	5102.99	5146.76	
33534	55.85	5103.24	5159.09	
33576	36.90	5117.53	5154.43	
33577	48.95	5107.25	5156.20	
33578	48.68	5106.57	5155.25	
33579	52.43	5104.59	5157.02	
33580	52.56	5104.05	5156.61	

TABLE A-1 (Continued)

WATER LEVEL MEASUREMENTS
JANUARY 7, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
33581	54.10	5105.28	5159.38	
33582	48.57	5104.66	5153.23	
33583	45.29	5109.21	5154.50	
33584	55.55	5107.74	5163.29	
33585	47.50	5107.71	5155.21	
33586	55.00	5105.52	5160.52	
33587	50.70	5105.54	5156.24	
33588	49.55	5105.51	5155.06	
34002	70.63	5121.23	5191.86	
34005	68.12	5115.68	5183.80	
34008	55.30	5110.31	5165.61	
34515	46.53	5120.04	5166.57	
M-01	55.10	5106.23	5161.33	
M-02	-	-	5145.56	LOCKED OFF
M-03	46.18	5093.73	5139.91	
M-05	38.20	5096.22	5134.42	
M-06	47.09	5105.88	5152.97	

TABLE A-2

WATER LEVEL MEASUREMENTS
APRIL 1, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
03001	75.66	5134.64	5210.30	
03002	69.55	5126.87	5196.42	
03005	22.49	5174.72	5197.21	
03008	63.61	5156.97	5220.58	
03009	76.25	5134.49	5210.74	
03010	70.92	5135.30	5206.22	
03516	62.83	5125.07	5187.90	
03517	58.92	5123.22	5182.14	
03518	48.67	5125.46	5174.13	
03519	59.7	-	5185.42	BELOW SCREEN
03522	72.25	5131.95	5204.20	
03523	66.13	5140.35	5206.48	
03526	62.72	5124.56	5187.28	
04010	68.56	5127.01	5195.57	
04013	69.91	5122.80	5192.71	
04017	63.33	5123.87	5187.20	
04019	62.84	5124.37	5187.21	
04021	71.00	5122.32	5193.32	
04024	70.84	5121.73	5192.57	
04026	65.50	5126.71	5192.21	
04030	65.91	5133.34	5199.25	
04524	61.00	5138.23	5199.23	
04525	62.38	5138.68	5201.06	
04527	63.21	5124.00	5187.21	
04528	68.88	5122.97	5191.85	
04529	70.82	5122.45	5193.27	
04532	64.85	5124.60	5189.45	
28018	46.71	5102.05	5148.76	
28020	41.14	5102.72	5143.86	
28021	42.00	5102.34	5144.34	
28022	34.59	5108.99	5143.58	
28023	35.94	5098.36	5134.30	
28027	39.09	5101.50	5140.59	
28503	46.89	5108.65	5155.54	
28513	36.22	5104.56	5140.78	
33001	54.59	5115.17	5169.76	
33014	52.12	5108.10	5160.22	
33017	58.25	5116.77	5175.02	
33018	60.92	5107.78	5168.70	
33025	53.17	5103.70	5156.87	
33030	57.20	5116.88	5174.08	
33033	40.65	5109.95	5150.60	
33038	66.65	5104.90	5171.55	
33039	52.34	5107.07	5159.41	

TABLE A-2 (Continued)

WATER LEVEL MEASUREMENTS
APRIL 1, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
33040	73.00	5108.00	5181.00	
33041	68.71	5109.17	5177.88	
33042	54.07	5110.81	5164.88	
33043	59.13	5112.26	5171.39	
33044	61.58	5113.51	5175.09	
33045	63.28	5114.09	5177.37	
33046	58.48	5117.48	5175.96	
33047	69.65	5120.74	5190.39	
33051	53.50	5103.64	5157.14	
33055	52.91	5103.45	5156.36	
33056	50.60	5103.01	5153.61	
33057	49.23	5102.47	5151.70	
33058	46.18	5102.46	5148.64	
33059	54.63	5108.17	5162.80	
33060	50.00	5110.54	5160.54	
33062	67.67	5107.69	5175.36	
33064	50.25	5112.99	5163.24	
33070	50.38	5104.70	5155.08	
33071	49.30	5103.80	5153.10	
33072	50.40	5102.76	5153.16	
33073	42.71	5102.65	5145.36	
33500	39.86	5112.16	5152.02	
33501	32.80	5118.86	5151.66	
33502	45.62	5113.93	5159.55	
33505	62.00	5104.07	5166.07	
33506	44.93	5103.58	5148.51	
33507	43.00	5102.68	5145.68	
33508	-	-	5156.29	DRY
33509	45.66	5103.42	5149.08	
33510	46.63	5106.98	5153.61	
33511	45.56	5106.90	5152.46	
33512	48.19	5107.08	5155.27	
33514	56.60	5120.22	5176.82	
33530	53.13	5114.44	5167.57	
33531	51.88	5112.38	5164.26	
33533	43.10	5103.66	5146.76	
33534	55.33	5103.76	5159.09	
33576	16.26	5138.17	5154.43	
33577	46.13	5110.07	5156.20	
33578	45.91	5109.34	5155.25	
33579	48.79	5108.23	5157.02	
33580	51.31	5105.30	5156.61	
33581	51.78	5107.60	5159.38	
33582	43.92	5109.34	5153.26	

TABLE A-2 (Continued)

WATER LEVEL MEASUREMENTS
APRIL 1, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
33583	41.58	5112.92	5154.50	
33584	53.61	5109.68	5163.29	
33585	45.48	5109.73	5155.21	
33586	52.57	5107.95	5160.52	
33587	48.25	5107.99	5156.24	
33588	47.00	5108.06	5155.06	
34002	70.38	5121.48	5191.86	
34005	67.82	5115.98	5183.80	
34008	55.00	5110.61	5165.61	
34515	46.26	5120.31	5166.57	

TABLE A-3

WATER LEVEL MEASUREMENTS
JULY 8, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
03001	75.82	5134.48	5210.30	
03002	67.77	5128.65	5196.42	
03008	63.61	5156.97	5220.58	
03009	76.46	5134.28	5210.74	
03010	71.09	5135.13	5206.22	
03011	48.71	5164.83	5213.54	
03502	76.13	5134.42	5210.55	
03503	75.94	5134.50	5210.44	
03504	58.56	5154.22	5212.78	
03505	70.70	5135.07	5205.77	
03506	75.69	5134.53	5210.22	
03507	68.23	5129.34	5197.57	
03508	71.07	5129.57	5200.64	
03509	67.41	5129.41	5196.82	
03510	75.22	5134.25	5209.47	
03511	75.37	5134.28	5209.65	
03512	78.26	5133.03	5211.29	
03513	77.30	5133.82	5211.12	
03516	63.18	5124.72	5187.90	
03517	57.20	5124.94	5182.14	
03518	48.92	5125.21	5174.13	
03519	60.00	-	5185.42	BELOW SCREEN
03522	72.38	5131.82	5204.20	
03523	66.13	5140.35	5206.48	
03526	62.33	5124.95	5187.28	
03527	71.82	5133.52	5205.34	
03528	76.26	5133.64	5209.90	
03529	77.59	5133.60	5211.19	
03530	76.53	5133.66	5210.19	
03531	76.61	5133.67	5210.28	
03532	77.45	5133.04	5210.49	
03533	77.26	5133.04	5210.30	
04002	51.68	5121.52	5173.20	
04003	53.95	5120.78	5174.73	
04004	51.81	5120.50	5172.31	
04007	52.94	5120.95	5173.89	
04010	69.03	5126.54	5195.57	
04013	70.65	5122.06	5192.71	
04014	70.16	5122.47	5192.63	
04017	63.89	5123.31	5187.20	
04019	63.32	5123.89	5187.21	
04021	71.90	5121.42	5193.32	
04024	71.93	5120.64	5192.57	
04026	65.88	5126.33	5192.21	

TABLE A-3 (Continued)

WATER LEVEL MEASUREMENTS
JULY 8, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
04027	66.19	5125.89	5192.08	
04030	66.07	5133.18	5199.25	
04031	65.94	5133.25	5199.19	
04035	64.76	5138.47	5203.23	
04036	63.81	5132.82	5196.63	
04037	66.79	5125.16	5191.95	
04038	60.54	5119.25	5179.79	
04040	53.85	5129.31	5183.16	
04041	60.05	5136.11	5196.16	
04042	67.80	5136.08	5203.88	
04044	51.54	5131.60	5183.14	
04047	55.52	5127.26	5182.78	
04048	63.44	5138.27	5201.71	
04049	62.88	5138.50	5201.38	
04050	65.11	5135.45	5200.56	
04051	66.00	5136.23	5202.23	
04076	65.11	5138.10	5203.21	
04077	60.71	5134.56	5195.27	
04501	65.19	5131.79	5196.98	
04502	65.26	5132.24	5197.50	
04503	65.85	5132.17	5198.02	
04504	64.29	5132.09	5196.38	
04505	64.39	5131.85	5196.24	
04506	66.03	5129.35	5195.38	
04507	64.82	5132.12	5196.94	
04508	65.10	5132.18	5197.28	
04509	65.50	5132.13	5197.63	
04524	60.91	5138.32	5199.23	
04525	62.28	5138.78	5201.06	
04527	63.75	5123.46	5187.21	
04528	69.57	5122.28	5191.85	
04529	71.68	5121.59	5193.27	
04532	65.51	5123.94	5189.45	
04533	64.79	5131.80	5196.59	
09010	66.73	5140.59	5207.32	
28014	43.14	5101.54	5144.68	
28018	45.54	5103.22	5148.76	
28020	39.60	5104.26	5143.86	
28021	40.36	5103.98	5144.34	
28022	33.69	5109.89	5143.58	
28027	38.01	5102.58	5140.59	
28030	38.79	5104.41	5143.20	
28503	48.08	5107.46	5155.54	
28513	35.26	5105.52	5140.78	

TABLE A-3 (Continued)

WATER LEVEL MEASUREMENTS
JULY 8, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
28514	36.58	5105.14	5141.72	
28515	41.50	5106.23	5147.73	
28516	48.71	5106.78	5155.49	
28517	47.48	5104.11	5151.59	
28518	39.58	5103.97	5143.55	
33001	55.00	5114.76	5169.76	
33002	46.79	5117.31	5164.10	
33014	61.46	5098.76	5160.22	
33015	49.31	5106.27	5155.58	
33017	58.43	5116.59	5175.02	
33018	70.53	5098.17	5168.70	
33030	59.60	5114.48	5174.08	
33033	40.78	5109.82	5150.60	
33036	45.18	5104.91	5150.09	
33038	67.33	5104.22	5171.55	
33039	54.03	5105.38	5159.41	
33040	74.33	5106.67	5181.00	
33041	71.01	5106.87	5177.88	
33042	57.74	5107.14	5164.88	
33043	60.49	5110.90	5171.39	
33044	-	-	5175.09	DRY
33045	-	-	5177.37	DRY
33046	60.91	5115.05	5175.96	
33047	70.92	5119.47	5190.39	
33048	67.74	5091.08	5158.82	
33049	65.24	5092.74	5157.98	
33050	66.89	5095.11	5162.00	
33054	54.16	5103.66	5157.82	
33056	50.41	5103.20	5153.61	
33057	48.89	5102.81	5151.70	
33058	45.44	5103.20	5148.64	
33059	63.74	5099.06	5162.80	
33060	54.79	5105.75	5160.54	
33063	68.98	5106.09	5175.07	
33064	54.55	5108.69	5163.24	
33070	50.75	5104.33	5155.08	
33071	49.27	5103.83	5153.10	
33072	49.58	5103.58	5153.16	
33073	41.59	5103.77	5145.36	
33074	62.07	5115.72	5177.79	
33076	55.63	5102.61	5158.24	
33079	66.06	5103.74	5169.80	
33080	60.19	5118.72	5178.91	
33424	8.78	5147.49	5156.27	

TABLE A-3 (Continued)

WATER LEVEL MEASUREMENTS
JULY 8, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
33425	13.10	5144.14	5157.24	
33426	9.85	5147.08	5156.93	
33427	7.29	5149.63	5156.92	
33428	4.76	5152.36	5157.12	
33429	15.85	5142.37	5158.22	
33430	56.75	5105.38	5162.13	
33431	63.40	5104.26	5167.66	
33432	71.95	5103.13	5175.08	
33500	45.42	5106.60	5152.02	
33501	37.29	5114.37	5151.66	
33502	49.00	5110.55	5159.55	
33505	62.10	5103.97	5166.07	
33506	44.81	5103.70	5148.51	
33507	41.39	5104.29	5145.68	
33508	51.75	5104.54	5156.29	
33509	44.64	5104.44	5149.08	
33510	46.86	5106.75	5153.61	
33511	45.45	5107.01	5152.46	
33512	48.02	5107.25	5155.27	
33514	57.45	5119.37	5176.82	
33531	56.41	5107.85	5164.26	
33533	42.29	5104.47	5146.76	
33534	54.16	5104.93	5159.09	
33576	46.63	5107.80	5154.43	
33577	50.42	5105.78	5156.20	
33578	50.43	5104.82	5155.25	
33579	52.85	5104.17	5157.02	
33580	51.96	5104.65	5156.61	
33581	54.56	5104.82	5159.38	
33582	48.23	5105.03	5153.26	
33583	48.70	5105.80	5154.50	
33584	59.22	5104.07	5163.29	
33585	50.86	5104.35	5155.21	
33586	59.34	5101.18	5160.52	
33587	54.20	5102.04	5156.24	
33588	52.24	5102.82	5155.06	
33592	50.64	5107.70	5158.34	
33593	44.21	5108.00	5152.21	
33594	48.06	5106.18	5154.24	
33595	47.74	5104.53	5152.27	
33596	50.68	5103.23	5153.91	
33597	45.01	5105.87	5150.88	
33598	54.67	5103.18	5157.85	
33599	51.17	5104.92	5156.09	

TABLE A-3 (Continued)

WATER LEVEL MEASUREMENTS
JULY 8, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft.msl)	COMMENTS
33600	62.00	5106.95	5168.95	
33601	51.78	5105.54	5157.32	
33602	52.25	5104.07	5156.32	
33603	56.23	5102.46	5158.69	
33604	67.10	5111.38	5178.48	
33605	56.05	5104.05	5160.10	
33607	57.66	5113.19	5170.85	
33608	65.14	5108.52	5173.66	
33609	62.63	5112.91	5175.54	
33610	48.19	5105.95	5154.14	
33611	63.78	5111.13	5174.91	
33612	42.60	5103.99	5146.59	
34515	46.62	5119.95	5166.57	
M-01	55.79	5105.54	5161.33	
M-06	46.91	5105.02	5151.93	

TABLE A-4

WATER LEVEL MEASUREMENTS
OCTOBER 2, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft. msl)	COMMENTS
03001	76.46	5132.86	5209.32	
03002	67.97	5128.45	5196.42	
03008	63.05	5157.53	5220.58	
03009	77.25	5133.49	5210.74	
03010	71.90	5134.32	5206.22	
03011	47.70	5165.84	5213.54	
03501	78.00	5133.73	5211.73	
03502	77.33	5133.22	5210.55	
03503	77.12	5133.32	5210.44	
03504	56.16	5156.62	5212.78	
03505	71.46	5134.31	5205.77	
03506	76.90	5133.32	5210.22	
03507	68.34	5129.23	5197.57	
03508	71.40	5129.24	5200.64	
03509	67.68	5129.14	5196.82	
03510	75.86	5133.61	5209.47	
03511	76.17	5133.48	5209.65	
03512	78.92	5132.37	5211.29	
03513	78.51	5132.61	5211.12	
03516	63.25	5124.65	5187.90	
03517	57.27	5124.87	5182.14	
03518	40.05	5134.08	5174.13	
03519	60.18	-	5185.42	BELOW SCREEN
03522	72.75	5131.45	5204.20	
03523	66.29	5140.19	5206.48	
03526	63.24	5124.04	5187.28	
03527	72.71	5132.63	5205.34	
03528	77.23	5132.67	5209.90	
03529	78.65	5132.54	5211.19	
03530	77.46	5132.73	5210.19	
03531	77.35	5132.93	5210.28	
03532	78.15	5132.34	5210.49	
03533	77.93	5132.37	5210.30	
04002	52.07	5121.13	5173.20	
04003	54.40	5120.33	5174.73	
04004	52.26	5120.05	5172.31	
04007	53.32	5120.57	5173.89	
04010	69.43	5126.14	5195.57	
04013	71.00	5121.71	5192.71	
04014	70.95	5121.68	5192.63	
04017	64.20	5123.00	5187.20	
04019	63.55	5123.66	5187.21	
04021	72.30	5121.02	5193.32	

TABLE A-4 (Continued)

WATER LEVEL MEASUREMENTS
OCTOBER 2, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft. msl)	COMMENTS
04024	72.40	5120.17	5192.57	
04026	66.15	5126.06	5192.21	
04027	66.51	5125.57	5192.08	
04030	66.79	5132.46	5199.25	
04031	66.68	5132.51	5199.19	
04035	64.85	5138.38	5203.23	
04036	64.69	5131.94	5196.63	
04037	67.14	5124.81	5191.95	
04038	61.05	5118.74	5179.79	
04040	54.10	5129.06	5183.16	
04041	60.14	5136.02	5196.16	
04042	68.03	5135.85	5203.88	
04044	51.85	5131.29	5183.14	
04047	56.00	5126.78	5182.78	
04048	63.50	5138.21	5201.71	
04049	62.97	5138.41	5201.38	
04050	65.41	5135.15	5200.56	
04051	66.26	5135.97	5202.23	
04076	65.17	5138.04	5203.21	
04077	61.00	5134.27	5195.27	
04501	65.90	5131.08	5196.98	
04502	65.80	5131.70	5197.50	
04503	66.72	5131.30	5198.02	
04504	65.11	5131.27	5196.38	
04505	65.11	5131.13	5196.24	
04506	66.33	5129.05	5195.38	
04507	65.60	5131.34	5196.94	
04508	65.49	5131.79	5197.28	
04509	66.22	5131.41	5197.63	
04524	61.00	5138.23	5199.23	
04525	62.30	5138.76	5201.06	
04527	64.00	5123.21	5187.21	
04528	69.95	5121.90	5191.85	
04529	72.00	5121.27	5193.27	
04532	65.76	5122.64	5188.40	
04533	65.52	5131.07	5196.59	
09010	66.66	5140.66	5207.32	
28014	43.08	5101.60	5144.68	
28018	45.53	5103.23	5148.76	
28020	39.44	5104.42	5143.86	
28021	40.00	5104.34	5144.34	
28022	33.78	5109.80	5143.58	
28027	38.06	5102.53	5140.59	

TABLE A-4 (Continued)

WATER LEVEL MEASUREMENTS
OCTOBER 2, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft. msl)	COMMENTS
28030	38.37	5104.83	5143.20	
28503	48.00	5107.54	5155.54	
28513	35.41	5105.37	5140.78	
28514	36.67	5105.05	5141.72	
28515	41.35	5106.38	5147.73	
28516	48.47	5107.02	5155.49	
28517	47.39	5104.20	5151.59	
28518	39.41	5104.14	5143.55	
33001	55.24	5114.52	5169.76	
33002	47.10	5117.00	5164.10	
33014	59.50	5100.72	5160.22	
33015	49.75	5105.83	5155.58	
33017	58.73	5116.29	5175.02	
33018	68.57	5100.13	5168.70	
33030	60.00	5114.08	5174.08	
33033	40.94	5109.66	5150.60	
33036	44.24	5105.85	5150.09	
33038	67.34	5104.21	5171.55	
33039	54.23	5105.18	5159.41	
33040	74.56	5106.44	5181.00	
33041	71.34	5106.54	5177.88	
33042	57.89	5106.99	5164.88	
33043	60.79	5110.60	5171.39	
33044	-	-	5175.09	DRY
33045	-	-	5177.37	DRY
33046	61.33	5114.63	5175.96	
33047	71.35	5119.04	5190.39	
33048	63.12	5095.70	5158.82	
33049	61.11	5096.87	5157.98	
33050	63.72	5098.28	5162.00	
33054	52.70	5105.12	5157.82	
33056	48.79	5104.82	5153.61	
33057	47.15	5104.55	5151.70	
33058	44.23	5104.41	5148.64	
33059	61.91	5100.89	5162.80	
33060	54.51	5106.03	5160.54	
33063	69.18	5105.89	5175.07	
33064	54.71	5108.53	5163.24	
33070	50.52	5104.56	5155.08	
33071	48.85	5104.25	5153.10	
33072	49.12	5104.04	5153.16	
33073	41.22	5104.14	5145.36	
33074	62.48	5115.31	5177.79	

TABLE A-4 (Continued)

WATER LEVEL MEASUREMENTS
OCTOBER 2, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft. msl)	COMMENTS
33076	54.62	5103.62	5158.24	
33079	65.33	5104.47	5169.80	
33080	60.60	5118.31	5178.91	
33339	75.64	5102.89	5178.53	
33340	73.64	5108.36	5182.00	
33341	68.34	5107.28	5175.62	
33424	8.850	5147.42	5156.27	
33425	4.370	5152.87	5157.24	
33426	7.600	5149.33	5156.93	
33427	5.360	5151.56	5156.92	
33428	5.890	5151.23	5157.12	
33429	8.000	5150.22	5158.22	
33430	8.360	5153.77	5162.13	
33431	32.10	5135.56	5167.66	
33432	5.55	5169.53	5175.08	
33500	45.09	5106.93	5152.02	
33501	36.78	5114.88	5151.66	
33502	46.82	5112.73	5159.55	
33505	62.15	5103.92	5166.07	
33506	44.50	5104.01	5148.51	
33507	41.27	5104.41	5145.68	
33508	51.79	5104.50	5156.29	
33509	44.57	5104.51	5149.08	
33510	47.06	5106.55	5153.61	
33511	45.63	5106.83	5152.46	
33512	48.19	5107.08	5155.27	
33514	57.81	5119.01	5176.82	
33531	56.41	5107.85	5164.26	
33533	42.28	5104.48	5146.76	
33534	54.12	5104.97	5159.09	
33576	45.59	5108.84	5154.43	
33577	50.18	5106.02	5156.20	
33578	50.28	5104.97	5155.25	
33579	52.73	5104.29	5157.02	
33580	51.78	5104.83	5156.61	
33581	54.70	5104.68	5159.38	
33582	48.08	5105.18	5153.26	
33583	48.13	5106.37	5154.50	
33584	58.66	5104.63	5163.29	
33585	50.43	5104.78	5155.21	
33586	58.79	5101.73	5160.52	
33587	53.90	5102.34	5156.24	
33588	52.00	5103.06	5155.06	

TABLE A-4 (Continued)

WATER LEVEL MEASUREMENTS
OCTOBER 2, 1991

WELL NUMBER	DEPTH TO WATER (ft.)	WATER ELEVATION (ft.msl)	TOP OF CASING (ft. msl)	COMMENTS
33592	50.15	5108.19	5158.34	
33593	43.55	5108.66	5152.21	
33594	47.77	5106.47	5154.24	
33595	47.55	5104.72	5152.27	
33596	50.53	5103.38	5153.91	
33597	44.30	5106.58	5150.88	
33598	54.63	5103.22	5157.85	
33599	51.28	5104.81	5156.09	
33600	62.23	5106.72	5168.95	
33601	52.16	5105.16	5157.32	
33602	52.22	5104.10	5156.32	
33603	55.78	5102.91	5158.69	
33604	67.36	5111.12	5178.48	
33605	55.76	5104.34	5160.10	
33606	73.12	5104.10	5177.22	
33607	57.94	5112.91	5170.85	
33608	65.25	5108.41	5173.66	
33609	62.88	5112.66	5175.54	
33610	47.85	5106.29	5154.14	
33611	64.07	5110.84	5174.91	
33612	42.35	5104.24	5146.59	
34515	46.76	5119.81	5166.57	
M-01	56.01	5105.32	5161.33	
M-06	46.96	5104.97	5151.93	

APPENDIX B

TABLE B-1

DBCP SAMPLING RESULTS
JANUARY 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
Extraction Wells			
33302	01/10/91	LT	0.130
33304	01/10/91	LT	0.130
33308	01/10/91	LT	0.130
33310	01/10/91	LT	0.130
33312	01/10/91	LT	0.130
33314	01/10/91		0.145
33316	01/10/91		0.490
33318	01/10/91		0.201
33320	01/10/91	LT	0.130
33325	01/10/91		1.46
33327	01/10/91		1.11
33329	01/10/91		1.31
33331	01/10/91		0.683
33333	01/10/91		0.247
33335	01/10/91	LT	0.130
33336	01/10/91	LT	0.130
33338	01/10/91	LT	0.130
Monitoring Wells			
28021	01/08/91	LT	0.130
28503	01/08/91	LT	0.130
33045	01/09/91	LT	0.130
33046	01/09/91	LT	0.130
33060	01/08/91	LT	0.130
33064	01/09/91	LT	0.130
33500	01/08/91	LT	0.130
33501	01/08/91	LT	0.130
33502	01/08/91	LT	0.130
33507	01/08/91	LT	0.130
33514	01/09/91	LT	0.130
33531	01/09/91	LT	0.130
33576	01/08/91	LT	0.130
33577	01/08/91	LT	0.130
33578	01/08/91	LT	0.130
33579	01/08/91	LT	0.130
33582	01/08/91	LT	0.130
33583	01/08/91	LT	0.130
33584	01/09/91	LT	0.130
33585	01/09/91	LT	0.130
33586	01/09/91	LT	0.130
33587	01/09/91		0.233
33588	01/08/91		0.253
C-III	01/10/91	LT	0.130

TABLE B-1 (CONTINUED)
DBCP SAMPLING RESULTS
JANUARY 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
M-01	01/10/91	LT	0.130
M-03	01/10/91	LT	0.130
M-04	01/10/91	LT	0.130
M-05	01/10/91	LT	0.130
M-06	01/09/91	LT	0.130

TABLE B-2
DBCP SAMPLING RESULTS
APRIL 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
Extraction Wells			
33302	04/09/91	LT	0.130
33304	04/09/91	LT	0.130
33308	04/09/91	LT	0.130
33310	04/09/91	LT	0.130
33312	04/09/91	LT	0.130
33314	04/09/91	LT	0.130
33316	04/09/91		0.929
33318	04/09/91		0.184
33320	04/09/91	LT	0.130
33325	04/09/91		0.952
33327	04/09/91		0.930
33329	04/09/91		0.242
33331	04/09/91	LT	0.130
33335	04/09/91	LT	0.130
33336	04/09/91	LT	0.130
33338	04/09/91	LT	0.130
Monitoring Wells			
03009	04/02/91		1.01
03523	04/02/91		22.
04015	04/02/91		1.35
04026	04/02/91		3.6
04028	04/02/91	LT	0.130
04528	04/02/91		0.742
04529	04/02/91	LT	0.130
28021	04/05/91	LT	0.130
28503	04/05/91	LT	0.130
28513	04/05/91	LT	0.130
33018	04/02/91	LT	0.130
33031	04/02/91	LT	0.130
33039	04/03/91		0.254
33040	04/03/91	LT	0.130
33041	04/03/91	LT	0.130
33042	04/03/91	LT	0.130
33043	04/03/91		0.229
33044	04/03/91	LT	0.130
33045	04/02/91	LT	0.130
33046	04/02/91	LT	0.130
33059	04/02/91	LT	0.130
33060	04/03/91	LT	0.130
33070	04/04/91	LT	0.130
33071	04/04/91		0.459
33072	04/04/91	LT	0.130

TABLE B-2 (CONTINUED)
DBCP SAMPLING RESULTS
APRIL 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
33073	04/04/91	LT	0.130
33500	04/05/91	LT	0.130
33501	04/05/91	LT	0.130
33502	04/05/91	LT	0.130
33506	04/03/91	LT	0.130
33507	04/04/91	LT	0.130
33510	04/03/91	LT	0.130
33514	04/02/91		0.208
33531	04/02/91	LT	0.130
33576	04/05/91	LT	0.130
33577	04/05/91	LT	0.130
33578	04/05/91	LT	0.130
33579	04/04/91	LT	0.130
33580	04/04/91		0.226
33581	04/04/91		0.404
33582	04/03/91	LT	0.130
33583	04/05/91	LT	0.130
33584	04/03/91	LT	0.130
33585	04/03/91	LT	0.130
33586	04/03/91	LT	0.130
33587	04/03/91	LT	0.130
33588	04/03/91	LT	0.130
C-III	04/09/91	LT	0.130
M-01	04/09/91	LT	0.130
M-03	04/09/91	LT	0.130
M-04	04/09/91	LT	0.130
M-05	04/09/91	LT	0.130
M-06	04/05/91	LT	0.130

TABLE B-3
DBCP SAMPLING RESULTS
JULY 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
Extraction Wells			
33301	07/17/91	LT	0.130
33303	07/17/91	LT	0.130
33309	07/17/91	LT	0.130
33316	07/17/91		0.312
33320	07/17/91	LT	0.130
33327	07/17/91		0.481
33330	07/17/91	LT	0.130
Monitoring Wells			
03009	07/10/91		1.27
03507	07/12/91		0.292
03508	07/12/91	LT	0.130
03509	07/12/91		2.21
03523	07/10/91		29.
03527	07/11/91	LT	0.130
03528	07/11/91		1.80
03529	07/11/91		0.752
03530	07/11/91		1.68
03531	07/10/91		0.337
03532	07/11/91		1.89
03533	07/11/91		0.362
04026	07/15/91		3.1
04506	07/15/91	LT	0.130
04528	07/15/91		0.376
04529	07/15/91	LT	0.130
28513	07/17/91	LT	0.130
33043	07/16/91	LT	0.130
33046	07/15/91	LT	0.130
33060	07/16/91	LT	0.130
33071	07/16/91	LT	0.130
33072	07/16/91	LT	0.130
33073	07/16/91	LT	0.130
33502	07/17/91	LT	0.130
33510	07/16/91	LT	0.130
33514	07/15/91	LT	0.130
33531	07/16/91	LT	0.130
33578	07/17/91	LT	0.130
33586	07/16/91	LT	0.130
33587	07/16/91	LT	0.130
33588	07/17/91	LT	0.130
33596	07/17/91	LT	0.130
33600	07/16/91		0.479

TABLE B-3 (CONTINUED)
DBCP SAMPLING RESULTS
JULY 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
33612	07/16/91	LT	0.130
M-01	07/17/91	LT	0.130
M-06	07/17/91	LT	0.130

TABLE B-4
DBCP SAMPLING RESULTS
OCTOBER 1991

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)	
Extraction Wells			
33301	10/04/91	LT	0.130
33303	10/04/91	LT	0.130
33309	10/04/91	LT	0.130
33316	10/04/91		0.186
33320	10/04/91	LT	0.130
33327	10/04/91		0.361
33330	10/04/91		0.198
Monitoring Wells			
03009	10/07/91		3.4
03507	10/08/91		0.264
03508	10/08/91	LT	0.130
03509	10/08/91		1.85
03523	10/07/91		17.
03527	10/08/91	LT	0.130
03528	10/07/91		0.256
03529	10/07/91		0.687
03530	10/07/91		0.396
03531	10/07/91	LT	0.130
03532	10/08/91		1.42
03533	10/08/91	LT	0.130
04026	10/09/91		3.4
04506	10/09/91	LT	0.130
28513	10/14/91	LT	0.130
33041	10/12/91	LT	0.130
33043	10/12/91	LT	0.130
33060	10/12/91	LT	0.130
33063	10/12/91		0.598
33071	10/12/91		0.197
33072	10/12/91	LT	0.130
33073	10/12/91	LT	0.130
33502	10/14/91	LT	0.130
33510	10/12/91	LT	0.130
33514	10/10/91	LT	0.130
33531	10/12/91	LT	0.130
33586	10/12/91	LT	0.130
33587	10/12/91	LT	0.130
33588	10/14/91	LT	0.130
33596	10/14/91	LT	0.130
33612	10/12/91	LT	0.130
M-01	10/03/91	LT	0.130
M-06	10/14/91	LT	0.130

APPENDIX C

TABLE C-1

TCE SAMPLING RESULTS
MONITORING WELLS
1991

JANUARY

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)
33584	01/09/91	8.25
33585	01/09/91	LT 0.10
33586	01/09/91	10.1
33587	01/09/91	3.04
33588	01/09/91	0.521

APRIL

SITE ID	SAMPLE DATE	CONCENTRATION (ug/l)
33584	04/03/91	19.2
33585	04/03/91	10.2
33586	04/03/91	14.9
33587	04/03/91	13.5
33588	04/03/91	9.73

APPENDIX D

TABLE D-1

WELLS INSTALLED IN 1991

IRONDALE	INSTALLATION DATE	FIRST MONTH OF OPERATION (1991), EXTRACTION/RECHARGE WELLS
Extraction Wells		
33339	02/21/91	April
33340	02/04/91	April
33341	01/31/91	April
33342	02/15/91	April
Injection Wells		
33423*	N/A	June
33424	03/28/91	June
33425	04/10/91	June
33426	04/15/91	June
33427	04/16/91	June
33428	04/17/91	June
33429	04/17/91	June
33430	04/24/91	June
33431	04/26/91	June
33432	05/02/91	October
Monitoring Wells		
28517	04/17/91	N/A
28518	04/15/91	N/A
33605	03/29/91	N/A
33606	04/01/91	N/A
33607	04/05/91	N/A
33608	04/08/91	N/A
33609	04/04/91	N/A
33610	03/26/91	N/A
33611	04/03/91	N/A
33612	04/16/91	N/A

* Extraction Well 33333 (W-33) was converted to recharge Well 33423 in March 1991.

N/A - Not Applicable

TABLE D-1

WELLS INSTALLED IN 1991

RAILYARD	INSTALLATION DATE	FIRST MONTH OF OPERATION (1991), EXTRACTION/RECHARGE WELLS
Extraction Wells		
03301	05/30/91	September
03302	05/25/91	September
03303	05/17/91	September
03304	05/13/91	September
03305	05/08/91	September
03306	03/26/91	September
03307	03/13/91	September
Monitoring Wells		
03527	03/11/91	N/A
03528	03/14/91	N/A
03529	03/19/91	N/A
03530	03/28/91	N/A
03531	03/25/91	N/A
03532	03/06/91	N/A
03533	03/13/91	N/A
MOTORPOOL		
Extraction Wells		
04301	02/26/91	September
04302	03/04/91	September
Monitoring Wells		
04533	03/04/91	N/A